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# COMPUTERWORLD

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# Apple sings 'Let It Be'

## OS deal with Be, Inc. looms

By Lisa Picarille

Apple Computer, Inc. is hashing out a deal to incorporate Be, Inc.'s BeOS in a hybrid operating system that would ship in mid-1997 and compete with Microsoft Corp.'s Windows NT, *Computerworld* has learned.

Users would get an operating system with increased stability and improved performance, according to Apple insiders and hardware and software developers close to Apple's Mac OS effort. But users also would lose some backward compatibility with current Macintosh applications.

"Apple needs to be able to have an operating system that will scale up so they can get serious in the server markets to compete with Microsoft," said Todd Blanchard, a consultant at Team Alliance in Denver. He is working on a project for Time Warner Communications, Inc.

The BeOS would give Apple users several sys-

**Apple,** *page 131*

JAMIE HOGAN

## COMDEX FEVER!!!

**You can cure it if you catch it.** Pick up some tips on how to restrain your staff despite all the hype and glitz.
SEE MANAGING, PAGE 88

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**About 250,000 people are expected** to stampede the show floor at Comdex for a technology sneak peek.
SEE PAGES 14 AND 15

# Informix to meld database to Web

By Craig Stedman

Informix Software, Inc. this week will announce development tools and middleware for building dynamic Web applications that hook into its databases.

Analysts briefed by Informix said the company is trying to put together an integrated architecture that streamlines the process of linking Java and ActiveX clients to its databases.

**Internet applications**

The technology will accommodate new multimedia applications and existing transaction programs that customers want to retool for the World Wide Web, the analysts said.

### Full of potential

Several Informix users said the planned tools sound like a promising way to ease the strain of building heavy-duty Internet or intranet applications that rely on back-end databases to rebuild Web pages on the fly.

"There is a large roll-your-own factor out there right now," said the chief technology officer at a Web publishing company that uses Informix databases. What Informix promises "sounds like an answer to all the stuff that I'm struggling to do here," he added, requesting anonymity.

Gary Thomson, vice president of information systems technology at Choice Hotels International, Inc. in Phoenix, said he also sees potential for the Informix products. The products could help his company develop an intranet-based supplies catalog that would let its seven hotel chains view and order products online.

Choice Hotels buys goods ranging from soap to bedspreads and curtains through a paper catalog, "but it's cumbersome to get

**Informix,** *page 131*

# Net boxes set up desktop shoot-out

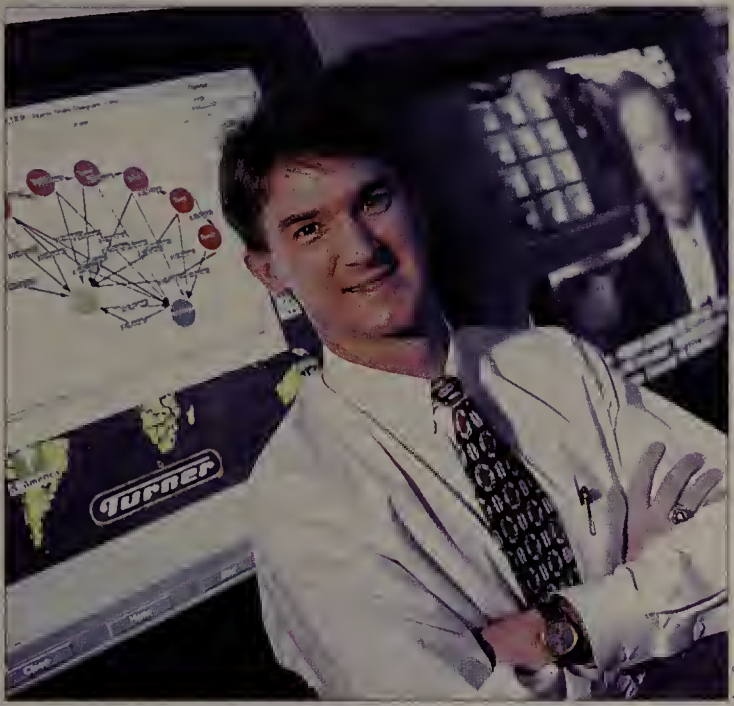
By Patrick Dryden
SANTA CLARA, CALIF.

The advent of Java-based thin clients and limited-function PCs stirred a mix of hope and dread among attendees at Enterprise Management Summit '96 here last week.

The systems will help cut the cost of maintaining distributed client/server systems, the attendees said. But battles over central control vs. user independence will be renewed.

Any attempt to remove end-user capabilities "would be culturally unacceptable in our organization," said Kevin Lynch, a network operations manager at Rohm and Haas Co. in Philadelphia. "Users would march on us carrying torches."

**Net boxes,** *page 131*



ANN STATES

**Turner's Scott Parker:** *Distributing software and controlling configurations 'would be a breeze' with network computers. '[But] in our news and entertainment business culture, everyone must be able to do their own thing.'*

# Users build Internet-based supply depots

By Mitch Wagner

Pundits used to say electronic commerce would create the paperless office. These days, companies are looking to electronic commerce to supply them with *more* paper. Not to mention paper clips, sticky pads and those little sponges for moistening envelope flaps.

A dozen Fortune 500 companies, including American Express Co., The Chase Manhattan Bank Corp. and IBM, are trying to develop Internet-based electronic commerce standards and services. The effort targets companies that buy high-volume, low-cost supplies, such as office and cleaning products, minor equipment repairs, lightbulbs and even contracts for temporary clerical workers.

Control of maintenance, repair and operations purchasing is impor-

**Supply depots,** *page 16*

## WHAT'S INSIDE

- Time Warner's acquisition of Turner Broadcasting is shaking up the IS staff. Turner CIO Elahe Hessamfar is reportedly leaving, and other employees are being offered severance packages. **See story, page 2,** *by Thomas Hoffman.*
- At 19, Ken Lacy was a clerk at United Parcel Service. Last week, at 47, he was named CIO. He says he plans to bring a strong end-user perspective to the job. **See story, page 4,** *by Thomas Hoffman.*
- Netscape and Microsoft are bringing Java to the millions of users still on Windows 3.1 systems. **See story, page 6,** *by Sharon Gaudin.*
- It's hot. It's new. It's NUMA. Find out why Sequent and other vendors are rushing to employ this multiprocessing technology. **See story, page 7,** *by Jaikumar Vijayan.*

Newspaper

## Up Front

# The RBOC whine

Let's hear a big wail of communal pity for the regional Bell operating companies (RBOC). Coming on the heels of a 20% jump in quarterly earnings, some of the Bells have lately taken to complaining that this Internet thing is just killing them.

Pacific Bell, the company that has so aggressively encouraged users to sign up for data-oriented Integrated Services Digital Network services, now says 'net users are threatening the integrity of California's phone system. The culprit: those dirty Internet service providers that take advantage of unlimited local calls to offer their customers all the Internet access they can eat for 20 bucks a month.

Pacific Bell says the average Internet connection lasts five times longer than the average voice call. Other RBOCs have now joined the caterwauling, asking the Federal Communications Commission to eliminate the exemption that lets Internet providers skirt per-minute charges.

The Internet-using community should rise up in indignation against this scam. For one thing, the Bells are evidently not hurting for cash so much that they can't pony up billions of dollars to buy one another. But apart from that, the Internet phenomenon could be undermined if the phone companies succeed in charging users per minute of access time.

Electronic commerce is at a crucial stage right now. Any regulation that increases the cost of access will drive users away and may fundamentally alter the economics of the Internet.

The big online services are scrambling to drop their per-minute access charges because they know a ticking meter is a barrier to growing their businesses. The same is true for the Internet service providers. It's in the interests of the Internet community to tell the RBOCs to quit their whining.

*Paul Gillin, Editor*
*Internet: paul_gillin@cw.com*

The 5th Wave by Rich Tennant

"Of course graphics are important to your project, Eddy, but I think it would've been better to scan a picture of your worm collection."

# IS upheaval at Turner

By Thomas Hoffman

Most of the more than 300 IS staffers at Turner Broadcasting System, Inc. in Atlanta are expected to keep their jobs following the company's acquisition by Time Warner, Inc. But many Turner technologists may find their roles recast — or relocated, *Computerworld* has learned.

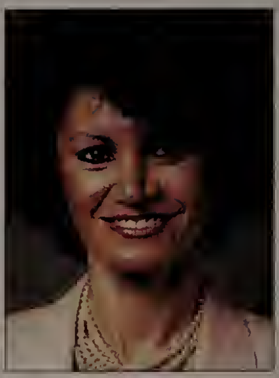
For example, 12 Atlanta-based information systems staffers in one division recently turned down offers to relocate to Time Warner facilities in New York, said an IS manager at Turner who requested anonymity.

"I'm also going to be offered a job in New York, but I don't want to go there — I'd be a small fish in a big pond," the IS manager said. He said he will probably opt for the severance package.

### Lost battle

Three sources at Turner said Elahe Hessamfar, Turner's chief information officer, will leave the company after losing a "power-play" battle with Time Warner CIO John Reece. Hessamfar wasn't available for comment.

Reece said he expects a substantial number of Turner IS employees to remain. But he couldn't quantify how many IS staffers would stay because the severance package being developed for the group isn't final. Reece said he expects to have more accurate figures on Turner's head count by the end of the month.



**Turner Broadcasting CIO Elahe Hessamfar** *is said to be leaving the company*

One of the Turner sources said 150 Turner programmers have already been retained for their respective business units. Reece said his philosophy is to keep those programmers tied to their business units as part of the new Time Warner. For example, Turner IS will continue to upgrade the company's financial systems to PeopleSoft, Inc. software.

The same Turner source also said the severance package is expected to include four weeks' pay and an additional four weeks' salary for each year of service.

Many IS staff members who work in regional offices in Los Angeles, London and Tokyo are expected to be retained. But regional IS staff members will take responsibility for global information technology support functions such as electronic mail, a Turner IS manager said. Those functions used to be delivered by Turner IS in Atlanta.

Computerworld *senior editor Patrick Dryden contributed to this story.*

## News Shorts

### Kahn leaves Borland

**Borland International, Inc.** founder Philippe Kahn resigned Thursday from the company's board of directors. In July, CEO and President Gary Wetsel resigned after Borland announced it would post a substantial quarterly loss. Kahn, who founded Borland in 1983, will pursue Java software development at Starfish Software, a company he cofounded in 1994.

### Explorer 4.0 beta late

**Microsoft Corp.** sent a letter to Internet Explorer beta testers last week that said the upgrade will be late. Explorer 4.0 was originally due to enter public beta tests this quarter, but that will likely be put off until January. A private beta for selected Explorer 4.0 testers is expected to start next month, the letter said.

### Lotus sues former exec

**Lotus Development Corp.** last week filed suit against former senior executive Don Bulens for allegedly violating his agreement to not recruit Lotus workers. Bulens quit his post as vice president of worldwide partners at Lotus in August to be president and CEO of Radnet, Inc., a start-up in Cambridge, Mass., that makes World Wide Web-based groupware. The suit was sparked by the recent resignation of a Lotus salesperson for a similar job at Radnet. Bulens denied the allegation.

### Hayes' comeback trail

**Hayes Microcomputer Products, Inc.** last week launched a broad line of modem and remote access server products. The Atlanta-based modem maker, which emerged from Chapter 11 bankruptcy protection this spring, plans to ship a 56K bit/sec. modem in January. It will also roll out a series of low-cost remote access servers, with four-, eight- and 16-port configurations priced from $232 per port.

### Next Unicenter rolling

**Computer Associates International, Inc.** expects by Thanksgiving to finalize CA-Unicenter: The Next Generation (TNG), the replacement for its systems management suite, *Computerworld* has learned. At least three beta-test sites have put Unicenter TNG into production use, according to Sam Greenblatt, vice president of advanced technology at CA in Islandia, N.Y. CA plans to launch CA-Unicenter TNG, complete with a three-dimensional interface and business process monitoring, in December.

### Former IBM head dies

**T. Vincent Learson**, chairman of **IBM** from 1971 to 1973, died last week at 83. Learson led the development of IBM's 360 mainframes in the 1960s, which ensured IBM's dominant position in the market for years to come. The company spent approximately $5 billion on the project. The 360 let IBM simplify its product lines so it could sell 360s to all kinds of corporate and government customers.

### Tandem, Pyramid deal

**Tandem Computers, Inc.**, **Pyramid Technology, Inc.** and **Siemens Nixdorf Informationssysteme AG** last week agreed to jointly develop clustering technology for the Unix and Windows NT markets. Under the deal, Tandem and Pyramid will combine elements of their respective clustering technologies in products that support Unix and Windows NT servers.

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Nov. 11, 1996

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ALAN LEVENSON

### In Depth

High-tech hotels

*Business travelers are wooed with everything from modem hookups to virtual butlers.*

See page 104.

# New UPS CIO eyes cyberdelivery

## Lacy touts his background as an end user

By Thomas Hoffman

**Ken Lacy,** *UPS' newly appointed CIO, won't forget the end user*

After spending the first 26 years of his career as an end user of technology, the newly appointed chief information officer at United Parcel Service of America, Inc. has a good idea of what users want.

And making it easy for customers to access UPS' World Wide Web site will be at the top of Ken Lacy's agenda as his company's battle with Federal Express Corp. and other delivery services spills into cyberspace.

Assessing the reliability of UPS' network infrastructure will be part of that critical task. "Hooking 1 million customers into us electronically, you can't afford to be down for five minutes," Lacy said.

**Outgoing CIO Frank Erbrick** *had Lacy's help in initiating a reorganization in August*

Lacy, 47, who will replace CIO Frank Erbrick when he retires in January, started his UPS career at 19 as a clerk. He moved on to several finance and accounting positions and became corporate controller. In 1994 he was named Erbrick's top lieutenant.

Industry pundits said they believe Lacy's background as a user will benefit him at the Atlanta-based package distributor.

"People who come out of the user space have long memories about what IS is really about," said Judith Hurwitz, president of Hurwitz Group, Inc. in Newton, Mass.

Too many CIOs make the mistake of "falling in love with technology" and forget their primary goal — to improve their organization's competitive position and productivity through information technology, she said.

In August, Lacy and Erbrick set up a new information services structure that aligns application development with specific UPS business functions, such as customer automation, customer development and data repositories. The reorganization was designed to help UPS' 4,000 information systems staff members communicate more effectively with end-user business departments.

Lacy said he believes the program will eventually succeed, although he admits that IS staffers are "still struggling to learn their new roles."

During Erbrick's tenure, which began in 1985, UPS developed a number of innovative systems. Those systems included handheld computers that UPS drivers use to capture and transmit package data and signatures, a large global telecommunications network with the first direct link to U.S. customs and what is believed to be the world's largest data cellular network. That system is used to transmit real-time tracking and delivery information in the U.S. and Canada.

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QuickPoll: What's wrong with this picture?

If PC hardware is getting better, why are PCs still so difficult to manage?

Careers: Don't be nervous. Be prepared

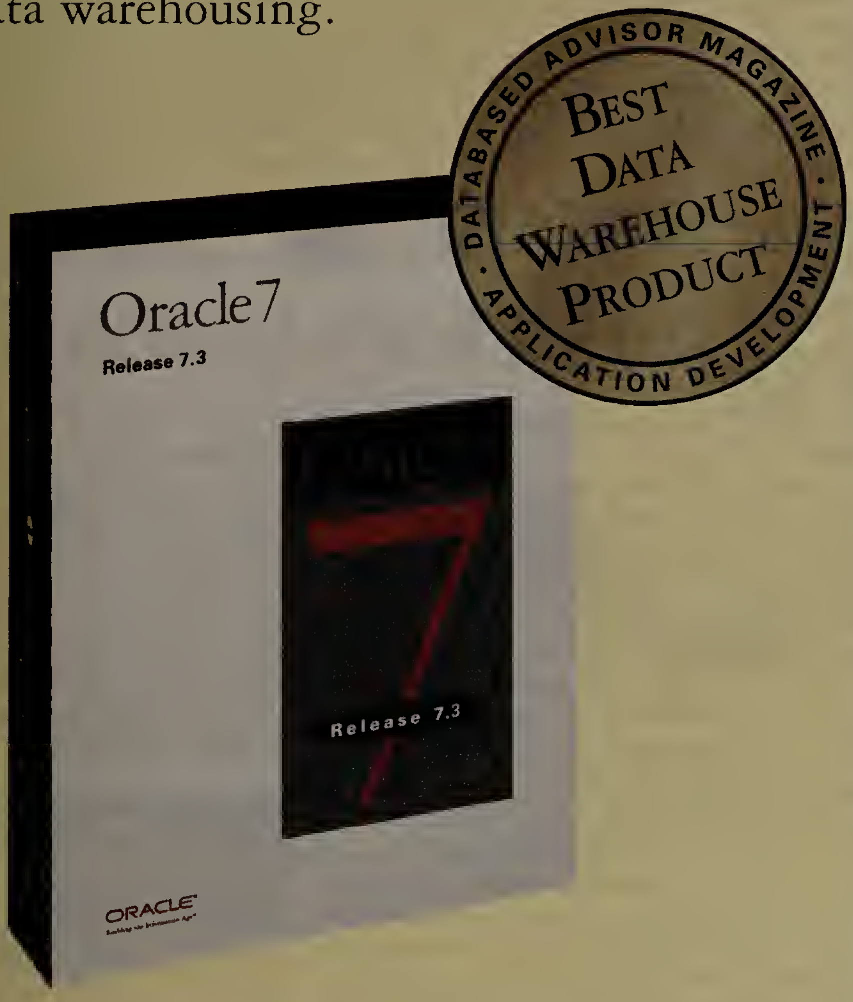
Landing your first IS job takes a combination of technical know-how, life experience and good interviewing skills. Here's what an interviewer is looking for.

www.computerworld.com quickpoll/index.html

# Oracle7
# #1 For Data Warehousing

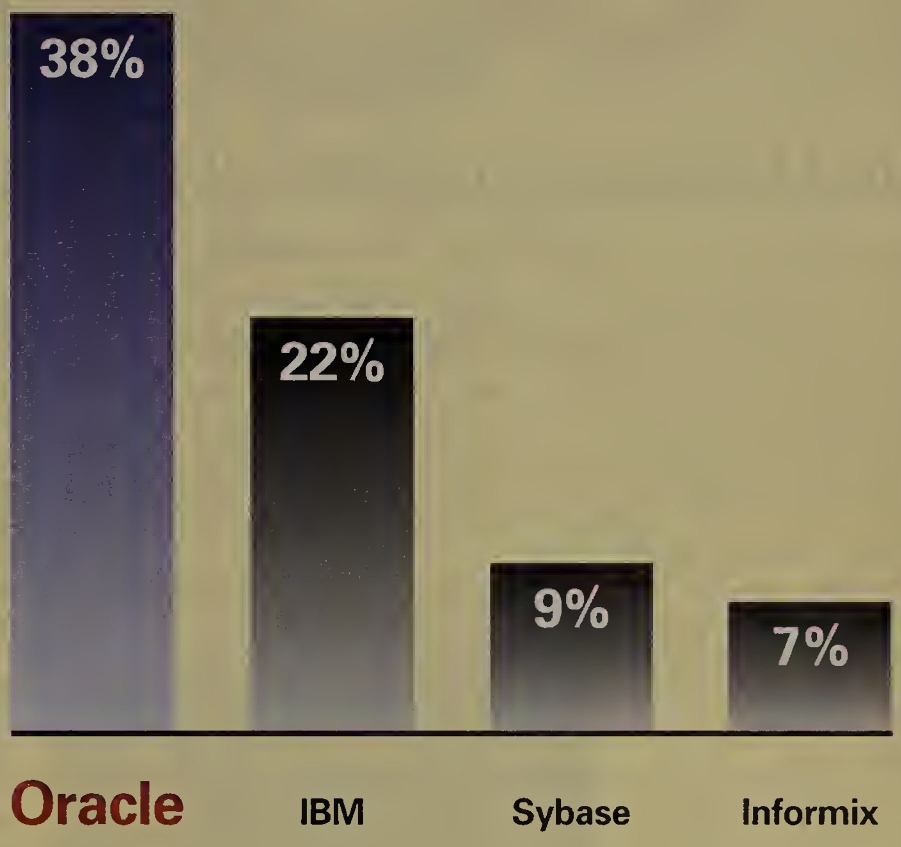
## #1 Readers' Choice

*Databased Advisor* names Oracle7 #1 for data warehousing.



## #1 Customer Choice

IDC names Oracle #1 in the worldwide data warehousing market.



**Top Four Vendors**

Oracle7 has more features for data warehousing than any other RDBMS: parallel query, index and load; bit-mapped indexes; star queries; OLAP integration; and scalability across a range of SMP and MPP systems. It's no wonder that more organizations rely on Oracle, from their largest data warehouses to their smallest data marts. And, it's why more application developers build their data warehouse solutions on Oracle7. So, if fast, accurate decisions are important to your company's performance, call Oracle at 1-800-633-1071, ext. 10345, or find us on the Web at http://www.oracle.com

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# Netscape, Microsoft ready Java for Win 3.1

By Sharon Gaudin

Netscape Communications Corp. and Microsoft Corp. are racing neck and neck to make Java work on nearly 100 million more Windows desktops.

Java applications require Windows NT, Windows 95 or another 32-bit platform.

That means much of the corporate world, which still uses 16-bit Windows 3.x systems, has been left out.

But that's about to change.

Microsoft last week announced that it will provide a way to run Java on 16-bit systems such as Windows 3.1 and Windows for Workgroups. The technology, which will be a software layer underneath the Java Virtual Machine, is slated to go into beta testing before year's end and start shipping in the first half of next year.

Netscape said its 16-bit Java technology will go into beta testing early this week and move into a public beta test by the end of next week. Edith Gong, product manager for Netscape Navigator 3.0, said she expects commercial shipping in the first half of next year.

"They say Java is blind and can run on every operating system, but it can't run on the one that everyone uses right now," said Paul Mahowald, vice president of retail development at Blockbuster Entertainment Group in Fort Lauderdale, Fla. "The majority of the about 1,000 people using my system remotely are on Windows 3.1."

Putting Java on Windows 3.1 would also help with corporate standardization efforts, said Kalman Shor, assistant director of MIS at Michael Anthony Jewelers, a jewelry manufacturing company in Mount Vernon, N.Y. "It would give us a commonality between what we run on the [network computers] and on the PCs." Shor said he is looking to buy some of IBM's upcoming network computers, which are said to run on a Java operating system.

Microsoft and Netscape are taking very different technical approaches to 16-bit Java computing.

Netscape made changes directly in the Java Virtual Machine code, said Wade Hennessey, manager of Netscape's Java Development division. For example, Netscape changed memory allocation and added code for multithreading capability — native to 32-bit platforms — to the 16-bit platform, he said.

Microsoft's approach is an added layer of software that translates between the 32-bit Java and the 16-bit operating system, said Charles Fitzgerald, program manager at Microsoft's Internet platform division.

Microsoft's translator also "lies" to the Java Virtual Machine, telling it Java's multithreading capability is working when it isn't.

But the layers, lies and translations also will slow down Java at a time when Java's sluggishness is already a concern.

"Windows 3.1 is never going to be as high performance with Java," Fitzgerald said. "I don't know if we're going to get 95% or 65% of the speed. We're still working on it ... but it's never going to be as good as a 32-bit environment."

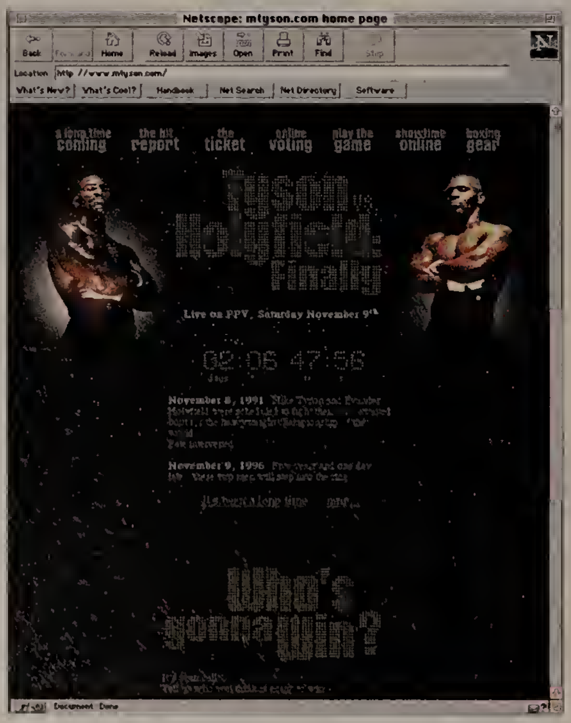
# Load balancing juggles calls at busy Web sites

By Bob Wallace

Users who think they can run a robust Internet site or intranet with just one server are in for a surprise more devastating than a Mike Tyson punch.

That's the message from New York-based Viacom Interactive Services, whose World Wide Web site for the world champion's boxing match last Saturday night was expected to take 1.5 million hits per hour.

In hopes of avoiding a punishing knockout, Viacom used innovative "load-balancing" software and hardware from Cisco Systems, Inc. to spread the calls across several networked servers.



**'We got up to 50,000 hits** *in an hour, and our server died' during an earlier Tyson fight, recalls Steve Plastrik, vice president at Viacom*

## TKO scored

Viacom previously tried to host an interactive boxing site for cable channel Showtime with just one server — before load-balancing products were available — and suffered a TKO during an earlier Tyson fight.

"We got up to 50,000 hits in an hour, and our server died," recalled Steve Plastrik, vice president of technical operations at the Viacom, Inc. division, whose other Web sites include MTV, VH1, Nickelodeon and Blockbuster Video.

"With the load balancer and six servers, we estimate we can handle 1.5 [million] to 2 million hits per hour," he said.

Pricing for Cisco's load balancer, called LocalDirector, starts at $32,000.

Load balancers are hardware devices that act as front-end traffic cops for Web servers. The software uses an algorithm to evenly and dynamically apportion incoming calls among multiple collocated servers to ensure timely user access to server-based applications.

Without load balancers, information systems managers would need more servers and likely a separate uniform resource locator and TCP/IP address for each one. And there would be no way to intelligently off-load calls from swamped Web servers.

"I can't imagine why someone would set up an industrial-strength Web site without a load balancer because they provide real benefits," said Maralyn Rosenblatt, vice president of client services at Countrywide Home Loans in Simi Valley, Calif.

A load balancer is much like an automated call distributor at a telephone call center.

## Big problem

"Load balancing was a big problem in the past at call centers and was solved. The more load-balancing tools we see, the closer we'll be to solving it for the Internet and intranets," Rosenblatt said.

A dearth of load balancers is available — for now. Cisco last year acquired a vendor that makes them, and HydraWEB Technologies offers them.

Plastrik said he expects other vendors to invade this tiny but important market soon.

"The last thing you want to do with a Web site or an intranet is anger a caller by presenting them with a 'server busy, try again later' response when they dial in because many won't come back," said Daniel Briere, president of TeleChoice, Inc., a consultancy in Verona, N.J.

"Users need to take any and all steps necessary to address load balancing when designing a Web site or intranet," he said.

# SAP posts APIs in push for standards

By Randy Weston

The push for open standards in the business application market is coming from an unlikely source: German software giant SAP AG, whose R/3 offering has traditionally been highly proprietary.

SAP last week posted on its World Wide Web site (www.sap.com) the specifications for 106 business application programming interfaces (API) — with a promise of more to come.

Ultimately, the open APIs will allow users to plug software modules from third-party vendors — such as finance or manufacturing applications — in to R/3 systems that have been upgraded to R/3 Version 3.1 systems.

This is the first step toward SAP's new architecture for R/3 Version 3.1, which will be available late next month.

"There is a need for standard interfaces to components," said Bobby Cameron, an analyst at Forrester Research, Inc. in Cambridge, Mass. "We believe SAP has the market clout to force, as a benevolent dictator, a set of standards on the industry."

In essence, the business APIs act as a protective layer between old R/3 code and new code. With them, users can upgrade their systems with minimum impact on old code, and third-party vendors can develop software that can be integrated easily. The APIs also allow users to upgrade component by component instead of overhauling an entire R/3 installation all at once.

Chevron Corp. in San Ramon, Calif., is knee-deep in an R/3 3.0 installation. The energy company isn't planning on a 3.1 upgrade just yet, but Norm Osborn, manager of the advanced financial systems project at Chevron, said SAP is moving in the right direction and the business APIs are useful for long-term planning.

### Partial list

Objects that SAP's new business API's are assigned to:

- Cost Center
- Creditor
- Customer Order
- Employee Credit Plans
- Employee Health Plans
- Employee Spending Plans
- General Ledger Account
- Internal Order
- Profit Center
- Purchase Order

"We'd like to see even more [openness] to increase functionality as long as there is a strategic link and controlled way of moving from one vendor to another," Osborn said. "You need this functionality as you get into the area of income tax processing, sales and use tax, and a whole host of things because SAP cannot or will not address it themselves."

# Sequent scales symmetrical servers

By Jaikumar Vijayan

By the first quarter of next year, corporate users will be able to lay their hands on a new generation of highly scalable Intel-based servers. The servers will provide substantially greater speed and performance than current symmetrical multiprocessing (SMP) systems.

After working on it for more than a year, Sequent Computer Systems, Inc. last week demonstrated the industry's first ready-to-ship server system based on an emerging technology, Non-Uniform Memory Access (NUMA).

NUMA is a technology that allows vendors to quickly and inexpensively link numerous microprocessors into one large, very fast multiprocessing system. The technology originally emerged from Stanford University and is being pushed by several major hardware vendors.

**The importance of NUMA**

NUMA lets users inexpensively scale their systems as application needs grow. It is more powerful than current SMP systems.

**How NUMA is different from clustering and massively parallel processing (MPP)**

Applications can run unchanged on NUMA systems but not on clustering and MPP systems. NUMA is also faster than MPP and clustering.

Sequent's NUMA systems will start at about $250,000, compared with the millions of dollars that mainframes can cost. Sequent claims to have sold a handful of these servers already, but they aren't really expected to be widely available until the first quarter of next year.

Sequent claimed its offerings can support up to 252 Intel Corp. 200-MHz Pentium Pro chips, up to 100T bytes of storage and tens of gigabytes of memory and offer between three and six times the performance of current SMP systems.

The Beaverton, Ore., company is expected to beat to market other vendors, such as Data General Corp., Sun Microsystems, Inc., IBM and Hewlett-Packard Co.

"You have basically gotten all the improvements that are easy to get out of SMP already," said Jonathan Eunice, president of Illuminata, Inc. in Nashua, N.H. "This is the next generation of multiprocessing."

SMP architectures, which are increasing in popularity, derive performance gains by harnessing multiple processors tied together in one system enclosure.

"But they don't scale well beyond 16 processors, which is not good enough for us the way our business has been growing," said Ed Prichard, chief information officer at Unocal 76 Product Co., a $4 billion division of Unocal Corp. in Costa Mesa, Calif.

The firm recently installed Sequent's first NUMA-based system, which has 24 Pentium Pro chips, 6G bytes of memory and 300G bytes of hard disk space.

The significance of NUMA technology lies in its speed and the manner in which it enables microprocessors to access a system's memory. That has been a major performance bottleneck in the past and is a primary reason system manufacturers haven't been able to significantly — and inexpensively — scale SMP systems beyond 30 or so processors.

But because NUMA dramatically improves a processor's ability to tap large amounts of memory, vendors can link a far greater number of processors than current SMP technology permits. The access speeds let SMP applications run unchanged on NUMA systems.

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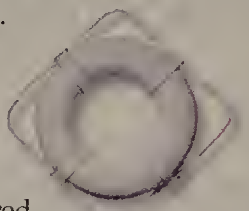

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# Traffic, glitches trip up Web on Election Day

By Gary H. Anthes

"Vote for the man who promises least; he'll be the least disappointing," American businessman and statesman Bernard Baruch once said.

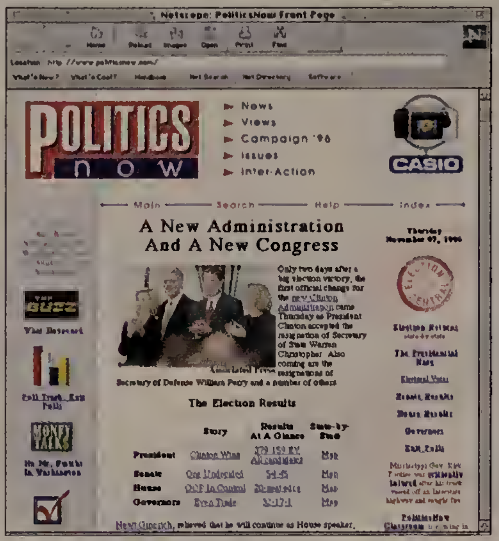
On Election Day last week, the Internet promised much and disappointed many.

It was rush-hour gridlock on the digital superhighway. Millions of election watchers, unable to reach World Wide Web sites set up to provide online election results, abandoned their PCs for a reliable standby — television.

Some of the sites, such as MSNBC (www.msnbc.com), were flooded with millions of hits and couldn't keep up, either because of insufficient computer power at the Web site or undersized connections from the site to the Internet. MSNBC is owned by NBC and Microsoft Corp.

### Sluggish surfing

Compounding the problem, UUnet Technologies, Inc., a major Internet service provider that hosted the Clinton/Gore re-election site (www.cg96.org), was hit by a faulty line card in a switch. That interrupted traffic for several hours on a 45M-bit/sec. backbone between Northern California and Washington.



A New Administration And A New Congress

The Election Results

**PoliticsNow** *was hit hard by a faulty line card in UUnet's system*

Election Day Web surfing was sluggish, said Greg Larson, chief information officer for the city of Scottsdale, Ariz. By contrast, he said, he was able to get election results online the next morning "instantaneously."

The slowdowns resulted from underpowered Web servers or from low-bandwidth connections between the servers and the Internet, said Alan Taffel, marketing vice president at UUnet. "Web site planners need to decide whether they are going to provide optimum services for average traffic load or for peak traffic loads," he said.

One way to avoid the problem is to have an Internet service provider host your Web server, Taffel said. Giving the server to a national provider puts it on an Internet backbone, he said.

Steve Hull, managing director at PoliticsNow (www.politicsnow.com), said it wasn't clear just where all the Internet bottlenecks were on election night. But, he said, PoliticsNow assigned six Digital Equipment Corp. Alpha 2100 servers to election duty, and none was overloaded.

However, PoliticsNow, a joint venture of The Washington Post Co., *National Journal* and ABC News, was hit hard by the UUnet snafu, Hull said.

Larson said he views this year as an "alpha test" for Internet-based election coverage. "As computers and TVs merge, in four years you'll have the race you're most interested in coming in from the Internet to a box in the corner of your TV screen," he said. "But you'll still have [NBC News anchor] Tom Brokaw on the rest of the screen."

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# DEC to expand links between VMS and NT

By Jaikumar Vijayan
ANAHEIM, CALIF.

This week's Digital Equipment Computer Users Society show here is unlikely to hold many surprises for the ever-dwindling faithful who attend the biannual show.

Reiterating a theme launched more than a year ago, Digital Equipment Corp. CEO Robert Palmer and Microsoft Corp. Chairman Bill Gates, will speak about the interoperability between Windows and Digital's Unix and VMS environments.

As expected, Digital will formally announce Wave 3 of its Affinity product line, which is intended to more closely tie Open VMS systems with Windows NT environments (see chart).

The company also is expected to spell out more details of its All-Connect Program to develop cross-platform middleware for Digital Unix and Windows NT environments.

Early details about Microsoft's upcoming 64-bit version of NT are also expected to be released during the show. Digital also will demonstrate Windows NT running on a 64-bit Turbocharger system.

"Digital is going to be the only place to turn to for 64-bit Windows NT hardware," said Rob Young, a software engineer at Knight-Ridder MediaStream in Philadelphia.

Also expected is a tussle between Microsoft and IBM for Digital's All-In-1 user base. Microsoft is expected to launch an effort to move Digital users to Exchange.

**Affinity Wave 3 features:**

- OpenVMS V7.1: High-availability server features, memory channel clustering and Very Large Memory
- OpenVMS Management Tools V2.0: Windows NT-based software for backing up and archiving on OpenVMS servers
- Application development tools
- Transaction processing: New version of Digital Application Generator for OpenVMS and Windows NT

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# Telcos lag on year 2000, analysts warn

By Kim Girard
and Robert L. Scheier

Telecommunications companies should be knee-deep into analyzing potential year 2000 problems by now if they hope to avoid billing problems, blocked telephone calls or even outages, experts say.

But carriers on the whole are lagging behind the financial industry, which is leading the year 2000 charge, said Bruce Hall, a research director at Gartner Group, Inc. in Stamford, Conn. "The [telecommunications] projects aren't on the scale that they need to be to get them out from under where you're at risk," Hall said.

"This is a problem of gigantic dimensions and with so many complexities that it's very hard to think something will not slip," said Bichlien Hoang, executive director of year 2000 network solutions at Bellcore, a telecommunications software, engineering and consulting firm in Morristown, N.J.

Carriers need to fix code in the custom software used for customer service, billing and financial information and in systems that support network switches and network management.

Many carriers are more focused for now on fixing internal software code. They believe the switching problem will be handled by suppliers, including Lucent Technologies, Inc., Nortel, Inc. and Siemens AG. But for now, there is no way to be sure equipment is year 2000-compliant, Hoang said.

Analysts said companies should set aside a buffer period before 1999 to work out any last-minute problems. They said testing could be as expensive and take as much time as identifying and fixing the problems.

Year 2000 project managers at the telecommunications companies contend they are moving quickly to fix the problems.

### Tricky testing

Testing is complicated because carriers must introduce year-2000-compliant products from vendors while testing links with new telecommunications providers. In the deregulated environment, those providers include cellular and personal communications services vendors.

"The [carriers] have so many points of entry," said Mike Egan, a year 2000 analyst at Meta Group, Inc., a consultancy in Stamford, Conn. "That's one screamer of a test job."

Bob Bender, director of systems development at Sprint Corp., said the company must determine how many of its 100 million lines of code are date-sensitive. "It's a very wide problem, but it's not a deep problem," Bender said. "Once you identify it, it's relatively easy to fix."

AT&T Corp., which has established a year 2000 program office, plans to test in cycles during the next two years and will begin fixing code next month.

"I think it's going to be a fair amount of work, a lot of project management," said George Brucia, year 2000 project manager at AT&T. "Right now, it's really not keeping me awake at night."

AT&T must peruse 500 million lines of code. Many times, only 5% to 10% of the code will have to be changed, but all code must be scanned to find the rogue dates.

Sprint is hiring an outside firm to do a full assessment but has six full-time and 20 part-time employees devoted to the problem. The company hopes to begin testing by 1998.

MCI Communications Corp. officials refused to discuss year 2000 plans. The company has hired Data Dimensions, Inc., a technology consulting services company, to do an initial assessment and tools survey.

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- Test the finished systems

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# No standards, no takers for Gigabit Ethernet

By Bob Wallace

Gigabit Ethernet has been heavily hyped in recent months. But users last week said they aren't planning to use the technology in their production networks until a standard is set in mid-1998.

Vendors have scrambled to show support for the high-speed technology, which is 100 times faster than regular Ethernet. Many have quickly laid out their Gigabit Ethernet product road maps and trumpeted near-term deliverables.

This creates problems for network managers because the first Gigabit Ethernet products will arrive ahead of the IEEE standard and thus probably won't be interoperable. Some vendors promise offerings by year's end.

"One thing I am very leery of is making any significant investment in products that are not based on a final standard," said Ron Rimmer Jr., a network manager at Wake Forest University in Winston-Salem, N.C. "Prestandard products would put stability in jeopardy."

**High-speed networking**

Gigabit Ethernet is a next-generation Ethernet technology that promises ultrafast, 1G bit/sec. network backbones. It will be used primarily to link powerful switches within and between buildings.

The most optimistic projections call for a standard in the first half of 1998. But 3Com Corp., Cabletron Systems, Inc. and smaller players plan many prestandard products.

"I've seen plenty of users burned bad by using prestandard products over the years," said Bill Horst, chief at the General Services Administration's communications branch in Philadelphia. "It's safer for IS managers to stick with tried-and-true technologies. And remember, mid-1998 for a standard is a best-case scenario."

Ken Cieszynski, a staff engineer at UAL Corp. in Elk Grove Village, Ill., has a slightly more optimistic outlook.

"Some of the user community adopted [Asynchronous Transfer Mode] before standards were complete, so I think the same could happen for Gigabit Ethernet," Cieszynski said.

SETH AFFOUMADO

**Wake Forest's Ron Rimmer** *won't make a big investment in products that aren't based on a final standard*

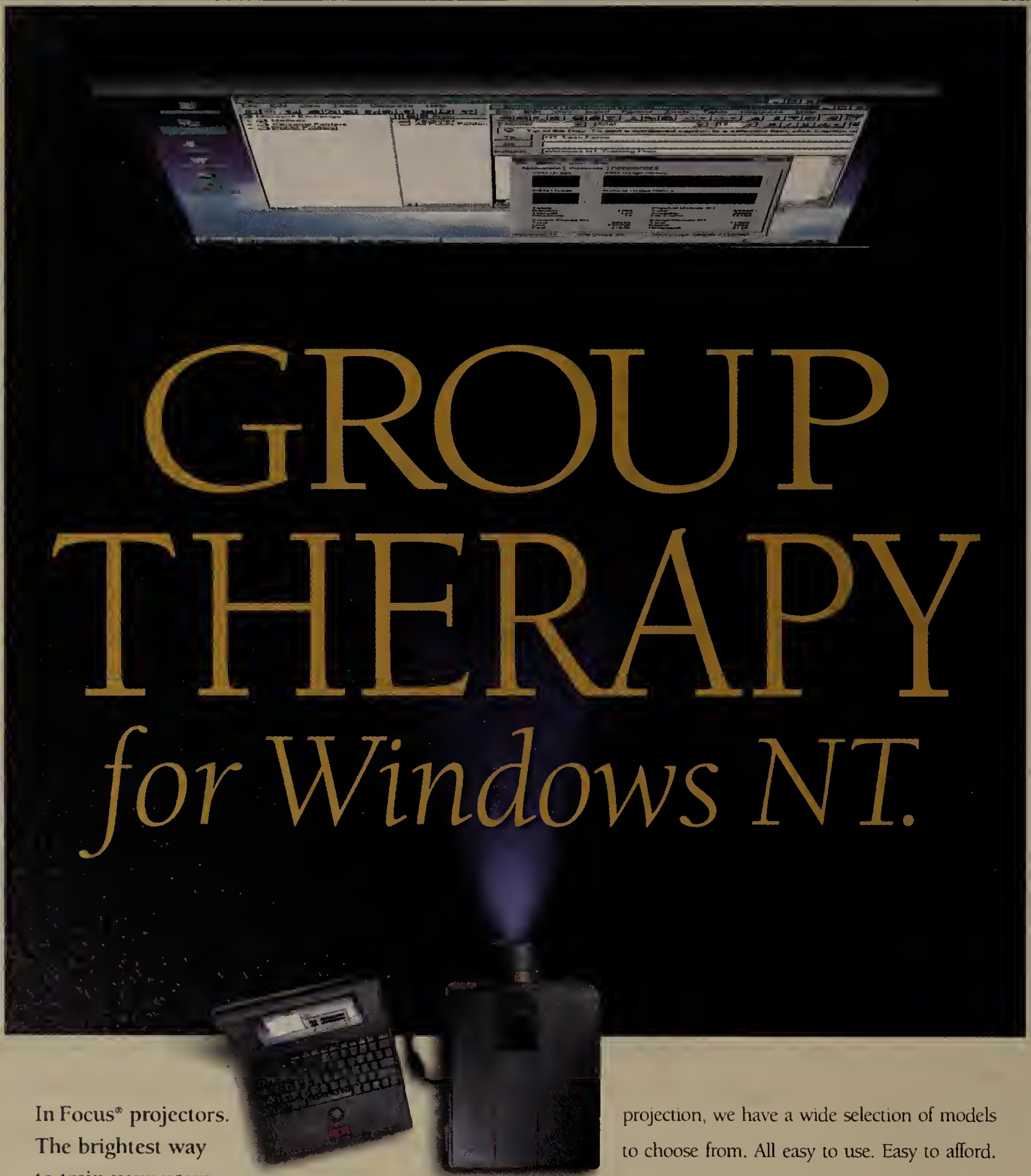
The Gigabit Ethernet marketing hype has accomplished one key goal: Users are interested in learning more.

"We're definitely interested in testing Gigabit Ethernet products when they become widely available, but that's a step we take well in advance of implementing new technologies in our production network," Rimmer said.

"It definitely has a future," Cieszynski said. "We'll look into it when products are generally available."

Despite the product hype, vendors are talking straight with users about the time frame for Gigabit Ethernet's emergence.

"What we tell users is to expect prestandard products in the first half of 1997, with some interoperability by midyear," said Nate Walker, product line manager of Gigabit Ethernet workgroup products at Cisco Systems, Inc. "And most products due in the second half will be based on the first draft of the [specification]."



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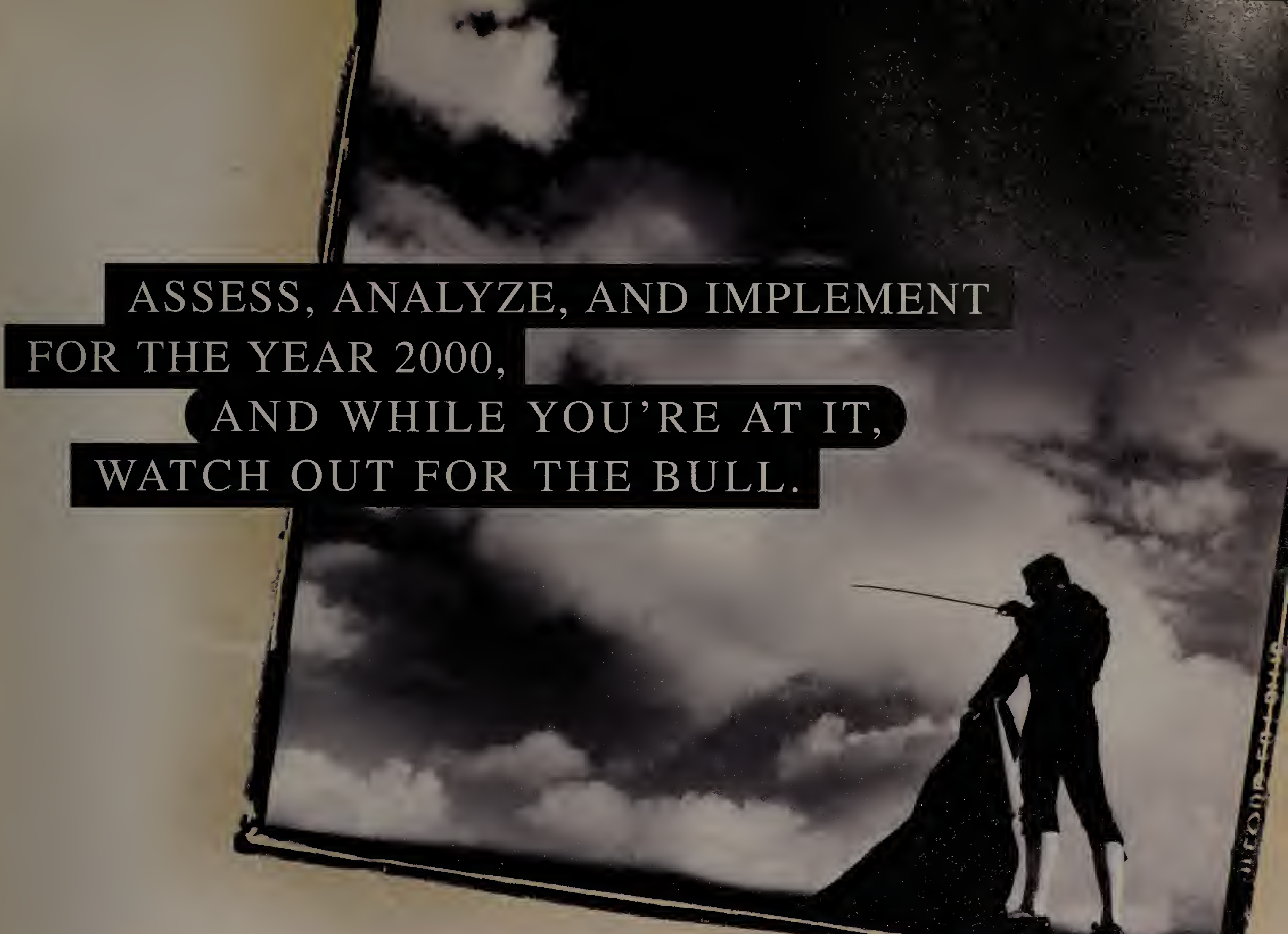

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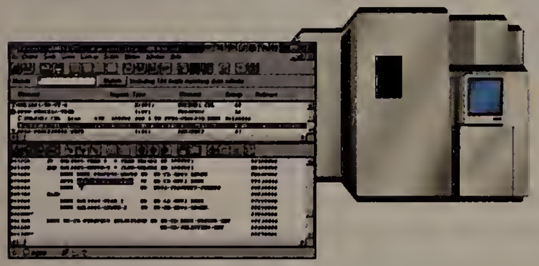

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# Microsoft plans tools to cut cost of PC ownership

By April Jacobs and Laura DiDio
LONG BEACH, CALIF.

Always quick to hedge its bets, Microsoft Corp. isn't just paving the way for the emerging network computer. It will equip future versions of its operating systems with tools designed to cut PC ownership costs.

At its Professional Developer Conference here last week, Microsoft announced its Zero Administration Initiative for Windows, which is supposed to automate some of the administrative procedures now performed manually or via other products.

Wayne Stein, a project manager at Electronic Data Systems Corp. in Detroit, said he was pleased with the automated installation and upgrade capabilities that Microsoft is building in to the Zero Administration Initiative.

"I can't quite believe we'll ever have complete zero administration, but the ability to automate many of our administration tasks is welcome news and will certainly save us time, money and untold stress," Stein said.

## New technology

Key pieces of the initiative, which will be offered in future versions of Windows 95 and NT, include the following:

- An automatic systems update and application installation that will allow the operating system to self-update at boot-up without user intervention.
- A Central Administration Lockdown that allows all aspects of Wintel client systems to be controlled by a central administrator across the network.
- A full implementation of the Active Platform, which was designed to allow administrators to deploy World Wide Web-style thin-client applications for the Internet and intranet.

**Microsoft's Zero Administration Initiative for Windows includes:**

- Automatic systems update and application installation
- Central Administration Lockdown
- Full implementation of the Active Platform

And while the technology may be far off — new versions of Windows 95 and NT aren't due for another year — users said they like the idea, although one analyst moderated his praise.

Dan Schuffert, a senior systems programmer at Stone Container Corp., a paper manufacturer in Chicago, applauded the Microsoft initiative.

"I love the concept. Zero administration would be a godsend. But I don't believe it's possible in our organization because we have a true heterogeneous environment with multiple hardware platforms, operating systems and applications," he said.

"Still, I welcome the efforts to automate my Windows NT updates and installation, and more central management tools," Schuffert said.

That could save Stone Container hundreds of manpower hours, he said.

"It's also an indication that Microsoft is becoming more responsive to users' needs, and I like the direction," he said.

But the effort isn't entirely new, according to Michael Gartenberg, an analyst at Gartner Group, Inc.

Many of the features are similar to those in Microsoft's Systems Management Server (SMS) technology. SMS is part of the BackOffice suite. It runs on the server and completes tasks such as automatic software distribution.

"They said that was going to do an awful lot, and it never quite made it," Gartenberg said. "So while the short-term steps they are taking [to reduce cost of ownership] are interesting, they are not really tremendous, and they're promising much more than they're delivering [right now]."

Gartenberg also warned users that the initiatives borrow heavily from the concept of network computing. "You're shifting the cost from the client to the server, and there is no magic bullet," he said. "You have to have change management in place and other processes to put this technology in place, otherwise, you're just shifting costs."

# Microsoft extends dual Windows strategy

By Laura DiDio and April Jacobs
LONG BEACH, CALIF.

Users are moving ahead with plans built around Microsoft Corp.'s confirmation last week that it will maintain and support two separate desktop operating systems — Windows 95/97 and Windows NT Workstation — for the next three years.

In the interim, Microsoft is preparing a white paper, due in the next two weeks, that will detail the migration path between the Windows platforms, *Computerworld* has learned.

Microsoft product manager Phil Holden advised current Windows 95 users to wait to migrate upward until Windows NT 5.0 ships sometime late next year or in early 1998.

Businesses that run Windows 3.11 or Windows for Workgroups should immediately adopt Windows 95, he said in an interview at the company's Professional Developers Conference here last week.

Users expressed little surprise, and some said they already plan to support Windows 95 and NT.

Tom Boos, senior vice president of information technology services and development at the Chorus Division of R. R. Donnelley & Sons Publishing Corp. in Chicago, said he wants Microsoft to ensure consistency among its operating systems platforms. "Right now, the variations among Windows 3.1, Windows 95, Windows NT and the IBM OS/2 Warp platforms are driving us nuts," Boos said. "We can live with both Windows 95 and Windows NT for now, but it's crucial for Microsoft to get things right and ensure compatibility between the two environments. Otherwise, it will be a nightmare for users."

**Key Windows NT features**

- Active Directory, which will support more than 10 million objects per store
- Private-key Kerberos security and X.509 public-key security system
- Microsoft Active Server technologies, the Distributed Component Object Model, Active Server Pages and Transaction Server, and Message queues
- Microsoft Management Console

Meanwhile, Boos said he is still rooting for a single Windows operating system kernel.

Richard Schell, vice president of information systems at ABC Television Network Group in New York, said he is confident Windows NT 5.0 will address compatibility issues that users and developers have been talking about.

All new applications at ABC are run through lab tests to make sure they run on both operating systems, he said.

## Good response

Users and analysts at the conference generally reacted favorably to the company's planned Internet/intranet capabilities, which will be built in to NT 5.0. Other previewed features include the Active Directory Service, which will incorporate a World Wide Web management console, and improved log-in scripting.

Overall, users said, Windows NT 5.0 and its attendant technologies will provide them with true distributed computing.

"This is an exciting set of announcements," said John Owrey, a network analyst at the University of Illinois, Chicago campus, and head of the 250-member Windows NT Chicago User Group. He said the Active Directory will "literally empower" his end users and let them update their user information on the Web and free the university's administrative staff to handle day-to-day problems.

Owrey was unfazed by NT 5.0's late ship date. "I'm not bothered by it because the computing issues Microsoft is taking on now are considerable. I'd rather have them take longer to do it and get it right," he said. It will take a year to exploit the feature set in Windows NT 5.0 anyway, he said.

Schell said NT 5.0's features will "mean greater ease of use, improved user productivity and increased network reliability."

Dan Schuffert, a senior systems programmer at Stone Container Corp., a paper manufacturer in Chicago, agreed. He said Microsoft's decision to go full-speed ahead with its Internet/intranet initiatives has given his firm "greater confidence" in the Windows NT platform.

& **Microsoft aims** new Office 97 version at small firms. See page 53.

## Network news

The Active Directory in Windows NT 5.0 will be accessible through directory interoperability standards, including the X.500 protocol and the Lightweight Directory Access Protocol (LDAP).

LDAP is an emerging directory access standard for the Internet that gives MS-DOS, Windows, Macintosh and Unix platforms a thin client. By contrast, the more robust X.500-based protocol designed for wide-area networks requires 500K bytes of memory.

The Active Directory comprises a set of so-called Active Server technologies that let users create logically centralized but physically decentralized networks.

With the Active Directory, networks, directories, applications and files can be off-loaded to run on different servers. This helps to maximize network uptime. IS managers can oversee networks from a central management console.

*— Laura DiDio*

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# Performers under Comdex's big top

By *Computerworld* staff

COMDEX
Fall '96

Comdex/Fall '96 promises to be the biggest ever.

Some 250,000 attendees are expected to pack the Las Vegas Convention Center and surrounding hotels next week to view products from an estimated 1,200 vendors and attend more than 70 technology sessions.

In the past two years, attendance has grown by nearly a third, according to Softbank Comdex, which puts on the show.

Keynote speakers include Intel Corp. CEO Andrew Grove on Monday, Microsoft Corp. Chairman Bill Gates on Tuesday and Netscape Communications Corp. CEO Jim Barksdale on Wednesday.

### World Wide Web products

- **Alpha Software Corp.** will introduce WebFiler, a database designed to be accessed only by Web browsers. The company will also show NetMailer, software that performs electronic-mail merging over the Internet.
- **Sequel Technology Corp.** will introduce Sequel Net Access Manager 1.5, an Internet management tool that supports SQL 6.5, Windows NT 4.0 and the Dynamic Host Control Protocol setup.
- **Frontier Technologies Corp.** will announce Web site administration utilities for allocating intranet network resources and monitoring security.
- **Luckman Interactive, Inc.** plans to demonstrate Web Studio, a $129 suite of Web development tools, and an upgrade of Web Commander, a secure server.

### Web access tools

- **Motorola's Information Systems Group** will unveil a host-based modem that will feature data, fax and voice capabilities. The software-based modem may simplify upgrades to technologies such as 56K bit/sec. transmission speed as standards are established, company officials said.
- **Netscape** will demonstrate its Communicator line of groupware, E-mail and other Web-based collaboration products.
- **U.S. Robotics Corp.** will demonstrate its NetServer/8 remote access server, which features Flash ROM software that increases the top speed of a standard modem from 28.8K or 33.6K bit/sec. to 56K bit/sec. The company will also showcase faster 56K bit/sec. modem technology.

### Laptops

- **Austin Computer Systems, Inc.** will preview its Edge line of high-performance notebooks, Elan PC desktops and Affinity XE department and enterprise file servers.
- **Texas Instruments, Inc.** will showcase the new ultrathin, lightweight notebooks of its Extensa 900 series. The notebooks weigh 2.2 pounds and feature 133-MHz Pentium processors, up to six hours of battery life, a CD-ROM drive and a 12.1-in. Super VGA color screen. They will cost between $3,299 and $4,299.
- **NEC Electronics, Inc.** will demonstrate its Versa notebooks, which use Phoenix Technologies, Inc.'s suite of system software to provide power management and PC card support for NT 4.0.
- **Compaq Computer Corp.** is expected to show its LTE 5000 notebooks, which use SystemSoft Corp.'s PowerProfiler and CardWizard software to supplement Windows NT 4.0.

### Servers and big boxes

- **Dell Computer Corp.** plans to announce a midrange server line, systems management tools and product strategies.
- **Digital Equipment Corp.** plans to show its new line of Intel-based Prioris servers, the HX 6000 Series, which will include 200-MHz Pentium Pro processors, four-way set associative cache, 512K- or 256K-byte dedicated cache, and management features through ServerWorks.
- **CompuTrend Systems, Inc.** will introduce its line of Pentium Pro-based computers, including the Premio FX Pro 2005, which features a 200-MHz chip with 512K bytes of cache.

### Applications

- **Cheyenne Software, Inc.** will unveil protection software for groupware systems, including Lotus Development Corp.'s Notes, Microsoft's Exchange Server and Novell, Inc.'s GroupWise. The suite will ship later this month for $2,495.
- **Verity, Inc.** will announce shipment of its Search '97 Personal for Exchange. The search engine software lets users search E-mail messages, public and personal folders and PC documents directly from Exchange clients.
- **Command Software Systems, Inc.** will release its real-time E-mail virus-checking software, CommandPost. The software package combines antivirus detection and disinfection software with MimeSweeper E-mail validation modules.
- **Netbot, Inc.**, a start-up company dedicated to intelligent software agents, is expected to make its debut at the show. The company plans to ship five agent products in the coming year based on MetaCrawler, a freeware search engine.
- **Elcom Technologies Corp.** in Malvern, Pa., will debut EZGuard, a surge eliminator that is always active and doesn't deteriorate following a power surge. It also protects PCs for the first 200 to 300 volts of a surge and redirects damaging surges through a ground loop.

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# SonicVibes makes waves

## Processor offers high-quality sound for less

By Matt Hamblen

S3, Inc. today plans to announce SonicVibes, a single-chip audio processor that the company claims will provide the quality of a $250 sound card on a $30 piece of silicon.

SonicVibes is the first product to bring wave table sound technology to the PC motherboard, according to the Santa Clara, Calif., company. Wave table technology provides more realistic sound because it stores digitized samples of actual instruments rather than creating sounds with electronic circuits.

The technology is expected to become important as users depend more on network computers and PCs for sales over the Internet and to do other work that requires faster graphics and video applications and better sound.

"Good graphics are very important to us now," said Kalman Shor, assistant director of MIS at Michael Anthony Jewelers in Mount Vernon, N.Y.

The company is about to invest in IBM Network Station computers to replace dumb terminals and will require graphics capability to show jewelry in fine detail over the company's intranet.

In two years, perhaps, high-quality sound for Internet commerce may matter to the company as well, Shor said.

### One downside

But Peter Glaskowsky, a senior analyst at MicroDesign Resources in Sunnyvale, Calif., said, "SonicVibes is not especially well-adapted to the [network computer] because it is a separate chip. ... One of the goals of the [network computer] is the lowest possible parts count, and if you want to drive the price of the [network computer] down to $500, you want sound combined with some other chip."

S3 is also releasing Plato/PX, which brings together a PC's system controller and multimedia accelerator on a $30 chip — cutting costs in half.

The processor is based on Shared Memory Architecture, which is considered important to bringing high-quality graphics and video performance to PCs and network computers.

S3 will show SonicVibes and the Plato/PX at Comdex/Fall '96.

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# IBM may incorporate Java into its network computer

By Sharon Gaudin

IBM's announcement last week that it had licensed some of Sun Microsystems, Inc.'s top Java technology is a strong indication that IBM will work the technology into its long-awaited network computer.

IBM has licensed Java OS, Sun's compact operating system that runs Java applications on virtually anything from network computers to cellular phones. It also licensed Sun's HotJava, a World Wide Web browser written in Java.

IBM executives refused to officially say what they will do with the Java technologies. But analysts briefed on the company's plans and two people within IBM said the Java technology will go into IBM's network computer, the Network Station. And the official announcement will probably come during Comdex/Fall '96 next week.

"You can assume that around Comdex time there will be some announcement in that space," said David Gee, worldwide marketing manager at IBM's Java and Internet division.

"I would be pleased if IBM worked Java into its [Network Station]," said Kalman Shor, assistant director of MIS at Michael Anthony Jewelers, a jewelry manufacturer based in Mount Vernon, N.Y. "That's the way we're going. Everyone is turning to Java. I don't see anything else with the kind of growth it's had in the past year. And we don't want to be left out."

IBM's announcement of its Network Station in September put it on the playing field with Sun, Microsoft Corp. and Oracle Corp. in the hot network computer market. Sun revealed its network computer, the JavaStation, two weeks ago. At the same time, Microsoft announced it is working on a thin-client networked PC specification.

The Network Station, which sources said will cost $695 and be available by year's end, will come with an IBM microprocessor, network adapter, keyboard and mouse. A monitor is optional.

*Senior writer April Jacobs contributed to this story.*

# Microsoft OS inspires handheld PC makers

By Mindy Blodgett

At next week's Comdex/Fall '96, you won't hear the dreaded PDA acronym from vendors announcing palmtop computers that run Microsoft Corp.'s Windows CE operating system.

COMDEX
Fall '96

Microsoft and vendors developing the devices are distancing themselves from the personal digital assistant (PDA) market, which never caught fire.

Instead, Windows CE devices from NEC Technologies, Inc., Compaq Computer Corp. and others are being called handheld PCs.

The Windows CE-based models will offer more desktop productivity applications, such as an Internet browser, than many PDAs currently on the market. But they may still run into some of the same hurdles that PDAs did, according to industry observers.

"They look great, but they still have similar problems, such as reflective screens. My eyes strain trying to read them," said Randal Giusto, an analyst at International Data Corp. in Framingham, Mass. "They may still be too expensive. And until they have such features as [Microsoft's] PowerPoint [presentation software], I don't know how much of a desktop extender they are."

Microsoft's specifications call for the devices to weigh a pound or less, have QWERTY keyboards, touch-screen displays and space for at least one PC card slot. They will have an infrared transceiver for wireless data synchronization with an infrared-enabled PC or notebook.

The devices will cost between $500 and $1,000.

Users said the Windows platform might draw them to a market they have previously ignored.

**Handheld PCs running the Windows CE operating system will:**

- Have a clamshell opening
- Have a touch-screen display
- Weigh 1 pound or less
- Feature an infrared tranceiver for wireless data sychronization to an infrared-enabled laptop or desktop

"I always felt the laptop gave me everything I wanted, but it does get heavy sometimes," said Mike Radigan, a program manager at Xerox Corp. in Rochester, N.Y. "With a smaller, lighter device that you could use to transfer data in a Windows environment, that means I could accomplish more, and that might make me interested."

NEC, Compaq, Philips Electronics N.V., LG Electronics, Inc. and Casio Computer Co. are expected to announced handheld PCs at Comdex in Las Vegas.

According to sources close to NEC, the company will offer two versions of its Mobile Pro handheld PC. One will cost $500, and the other will cost $750. Both will offer 4M bytes of RAM and wireless communications capabilities.

Casio is expected to release the Cassiopeia, a device that will interact with Microsoft Exchange for electronic mail. Philips will offer an integrated modem and a backlit screen, sources said.

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# CA loses case again

By Thomas Hoffman

Computer Associates International, Inc. has lost the latest round in a federal racketeering case.

A New York appellate court last week unanimously upheld the ruling of a Supreme Court judge that the Islandia, N.Y., software giant must return ownership of DataVantage, a mainframe debugging tool, to its original four developers. In addition, CA must pay the group more than $12 million as part of an award entered last year following an arbitration panel ruling that CA had violated the Federal Racketeer Influenced and Corrupt Organizations Act.

### New appeal filed

But CA has already filed a motion to appeal the latest decision to the same five judges who just voted unanimously against it. Those judges will decide if CA has a right to have its case heard by the New York Court of Appeals in Albany. If that doesn't work, CA may appeal the case to the U.S. Supreme Court. The U.S. Supreme Court hears less than 10% of the cases presented to it.

"It's not clear that CA will get another bite of the apple," said Ronald Abramson, a lawyer at Hughes, Hubbard & Reed LLP in New York.

Meanwhile, the DataVantage developers are considering suing CA again — this time for 50 alleged discrepancies they claim to have uncovered from multiyear licensing deals that CA signed during the four-year court battle.

One of the developers, Joseph Bonomo in Ramsey, N.J., claims CA owes him and the other plaintiffs royalties. CA was forced to transfer ownership of DataVantage and its customers in May, but Bonomo claims CA has hidden royalties from DataVantage licenses that were signed after litigation began.

Under the latest ruling, CA must turn over its DataVantage records and a copy of its 1994 settlement agreement with Electronic Data Systems Corp. Under that settlement, EDS received the right to use DataVantage and other CA products. As such, Bonomo and his partners want to determine whether EDS is "hiding" additional DataVantage customers they are not aware of, he said.

A spokeswoman for CA said the company "expects to be vindicated."

# Mahoney shaken from Banyan tree

## Critics, users want to see more focus on marketing, quicker product development

By Laura DiDio and Stewart Deck

After 13 years at the helm of Banyan Systems, Inc., founder David C. Mahoney — under fire from dissatisfied shareholders — has dropped the reins as chairman, president and chief executive.

The most immediate impact for the company and its customers will be that Banyan is now free to bring in fresh blood capable of pushing into high gear badly needed marketing and product development — especially its Windows NT connectivity offerings.

Along with 15 other longtime Banyan users, Bob Whelan, assistant director of network services at Northeastern University in Boston and president of the New England Banyan Users Group, was elated.

### Butting heads

"Frankly, with Mahoney out of the management loop, Banyan is free to move ahead and keep pace with the rest of the market instead of remaining stagnant with no new revenue growth and little product innovation. The company needs to grow; with Mahoney, it was shrinking," Whelan said.

"Banyan desperately needs to transition to a network services provider, and it's very difficult for people [such as Mahoney] who have been there since Day 1 to see that and implement the necessary changes," said Bill Sheehan, a senior technical support specialist at Stone and Webster Engineering Corp. in Boston.

**Banyan's David C. Mahoney:** *Shareholders say the company shrank under Mahoney*

The Westboro, Mass.-based company's shrinking market share and declining profits have put Mahoney under fire. Users also complained that he repeatedly vetoed efforts by his managers to make strategic changes designed to make Vines more of a mainstream solution.

"It was always his way or the highway," Sheehan charged.

Many of the industry's top executives — including Jim Allchin, Jim D'Arezzo and Peter Hamilton — left Banyan after butting heads with Mahoney. And last spring in an unprecedented move, a small but vocal group of shareholders launched an unsuccessful bid to oust Mahoney.

Two sources close to the vendor said Banyan's stock decline from a 52-week high of 13½ last December to a low of 3½ last week was the last straw for the board and the increasingly restive shareholders.

However, Mahoney said he made the decision to step down from his executive posts several months ago.

"I've felt for awhile that the company needs a strong focus on sales and marketing. This was my decision," he said. Mahoney added that while he feels Banyan continues to have a "sound" strategy, "it hasn't been crisply and effectively focused and executed, and I accept responsibility for that."

Always a networking also-ran — albeit one whose Vines network operating system commanded a 50% market share among Fortune 500 accounts — Banyan has seen its market share drop to 3%, half its height in the early 1990s.

Revenue has also fallen from about $150 million three years ago to projected annual sales of just under $100 million.

Although its StreetTalk enterprise directory services component is highly regarded, under Mahoney's stewardship, Banyan failed to attract small and midsize users, who until recently accounted for the largest market segment. Its close identification with Unix turned off corporate users, who opted to install Novell, Inc.'s NetWare, giving that product 65% market share and consigning Vines to niche market status.

Banyan's senior vice president and chief financial officer, Jeffrey Glidden, has been appointed acting president. John Burton, former president and CEO of Legent Corp., will fill the post of chairman of the board.

Mahoney will be vice chairman of the company's board of directors.

# Supply depots

CONTINUED FROM PAGE 1

tant because it accounts for about 40% to 60% of all corporate expenses, and the percentage is increasing, said Peter Roden, a partner at SupplyWorks, Inc. The Lexington, Mass., consultancy works with big companies on using electronic commerce to streamline purchasing.

### Ease of use

Internet-based MRO purchasing systems would be a boon to business, said Jim Mason, a corporate information systems manager at Airgas, Inc., a gas supplier in Radnor, Pa.

"You wouldn't have to write up a purchase order, print it out, fax it and make sure the fax goes through," Mason said. "You'd just fill it out online, fax it, and when you hit the 'send' button, you'd know the order goes through."

The MRO systems need to keep track of an MRO supplier's inventory and pricing, process payments and arrange product delivery. In that respect, they are similar to "catalog servers" from Microsoft Corp., Netscape Communications Corp., ICat Corp. and others that were designed primarily for retail sales.

But MRO systems need to do more than that. They have to track the special pricing and product availability agreements set in the contractual relationship between suppliers and purchasers. The systems will also track buyers' internal billing numbers and keep track of which employees have the authority to buy which types of merchandise. Similar to electronic data interchange (EDI) services, which typically run across links among user networks, MRO systems are Internet-based and present an easy-to-use, browser-based front end for end users and IS managers.

Amex is working with 15 companies in an Internet Purchasing Roundtable to develop standards for Internet-based technology for MRO purchasing.

Amex met last week with computer vendors, including Oracle Corp., Microsoft Corp. and Cambridge, Mass.-based electronic commerce vendor Open Market, Inc., to discuss MRO development. It has also been working with SupplyWorks on the project.

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Businesses need to keep track of billing numbers and procedures, while also ensuring that only authorized employees can purchase products online.

Meanwhile, Chase has a similar project ongoing with some of its corporate customers. The bank expects a pilot electronic MRO project to be deployed by the end of the year and to be generally available by the second quarter of next year.

### Big fan

IBM is also big on MRO. It recently announced the World Purchasing program, which runs on the World Wide Web or Notes. Staples, Inc. is among the companies participating.

The Chase system will run on a server on the supplier's premises or at a third-party site selected by the supplier. IBM will offer that setup or install a server inside the buyer's firewall. The buyer's server would communicate with the supplier systems via the Internet or proprietary EDI connection.

Information wasn't available last week on whether IBM and Chase are part of the Internet Purchasing Roundtable or if their systems will be compatible with each other or with what Amex is developing.

Amex's goal is to ensure that any MRO products developed can use the American Express Purchasing Card, said Thayer Stewart, vice president of product development at American Express Corporate Services Division in New York.

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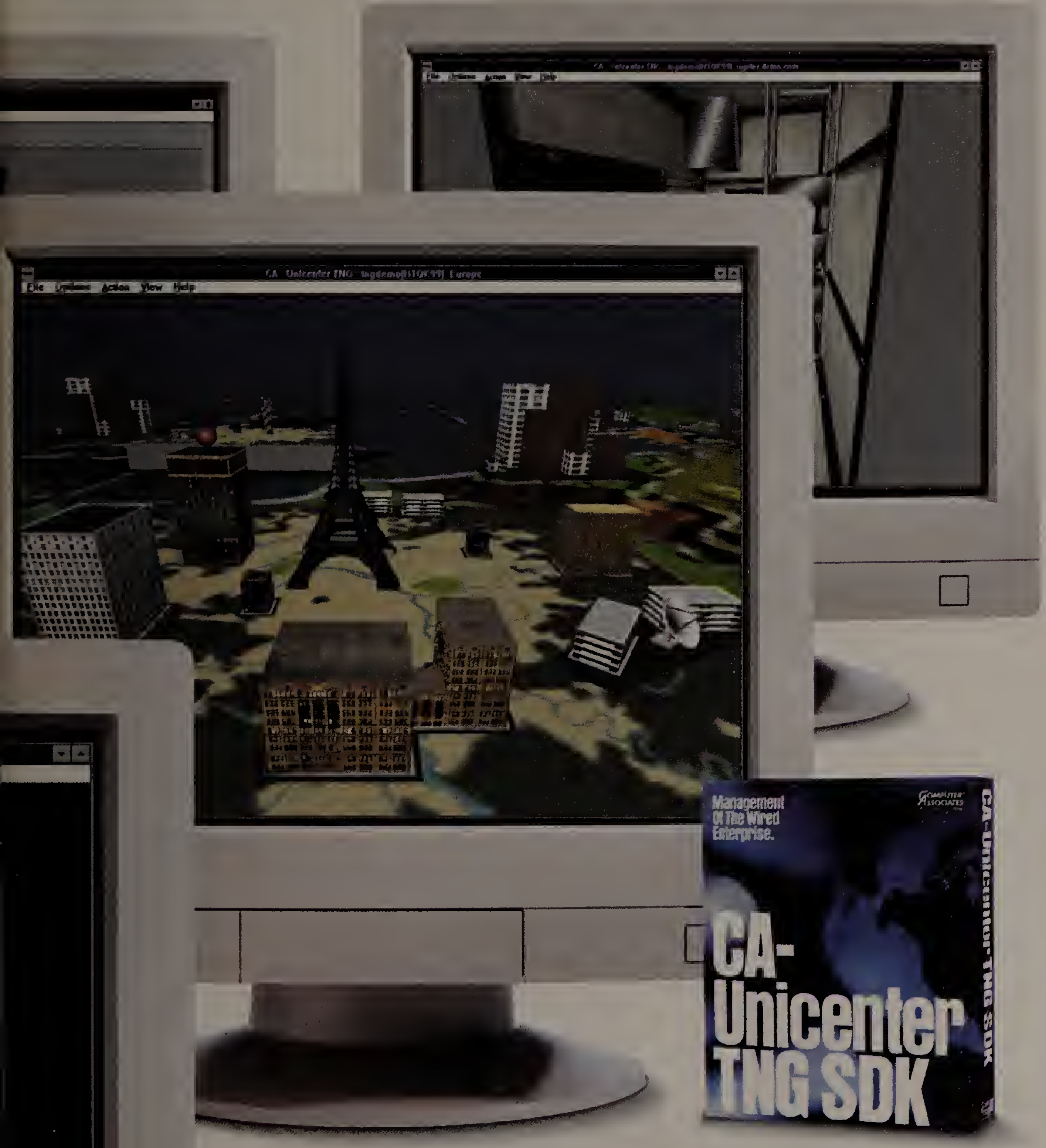

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# Quarterdeck support leaves users hanging

By Stewart Deck

On the chilly day last week when Quarterdeck Corp. moved its help desk operations, some users were left out in the cold for a few hours. Per normal, Quarterdeck had shut down its primary support operations Friday for the weekend.

That particular weekend, the company boxed up the 300- to 400-person office (including nontechnical support staff) and started to move it to a location a few miles across town in Columbia, Mo.

"Since we had to pick up everything, move it over and get the phone lines switched ... we knew we wouldn't be finished by Monday, so we planned on being closed," said Stan Young, enterprise telecommunications manager at Quarterdeck. "We put an announcement to that effect on the help desk line."

## Message no help

But a recorded message wasn't much help last Monday morning to user Katharine Windsor, the MIS project manager at Bacova Guild Ltd. in Bacova, Va.

Bacova Guild, a manufacturing subsidiary of Burlington Industries, Inc., had just upgraded more than 100 copies of Quarterdeck's ProComm Plus network-connection software and needed help to decipher some of the updated features.

"All the message said was, 'I'm sorry, we're closed today,' with no other explanation," Windsor recalled.

> "If I had designed our move that way, I'd have been fired."
>
> —*Katharine Windsor, Bacova Guild*

She ended up calling Quarterdeck's corporate offices in Santa Monica, Calif., where a company operator told Windsor about the office move. The operator also explained that she had been inundated with frustrated tech support calls.

"This person said she couldn't help me, I couldn't reach the help desk that day, and she didn't know when the help lines would be back up," Windsor said. "I was appalled. This kind of company support could make me start to question the product."

Young said he understands users' frustrations. But "with the size of this move and the cutting over of phone lines, it was difficult to predict how quickly we could have [the system] back up," he said.

## No excuse

"That sounds pretty inexcusable. An entire weekend is a huge amount of time to get that kind of job switched over," said Patrick Bultema, president of The Bultema Co. in Monument, Colo., and former director of the Help Desk Institute.

"Unfortunately, this is not an uncommon problem," Bultema explained, "because sometimes [the company] doesn't deal with the right people at the service provider, the ones [that are] in call center services."

With proper attention, Bultema said, all the telephone lines can be tested before the switchover is made, so service and support don't have to be interrupted.

Young said Quarterdeck's help desk lines were back in operation by 4 p.m. Monday. The telephone lines heated up quickly with calls from users who had been shivering all day, waiting for support.

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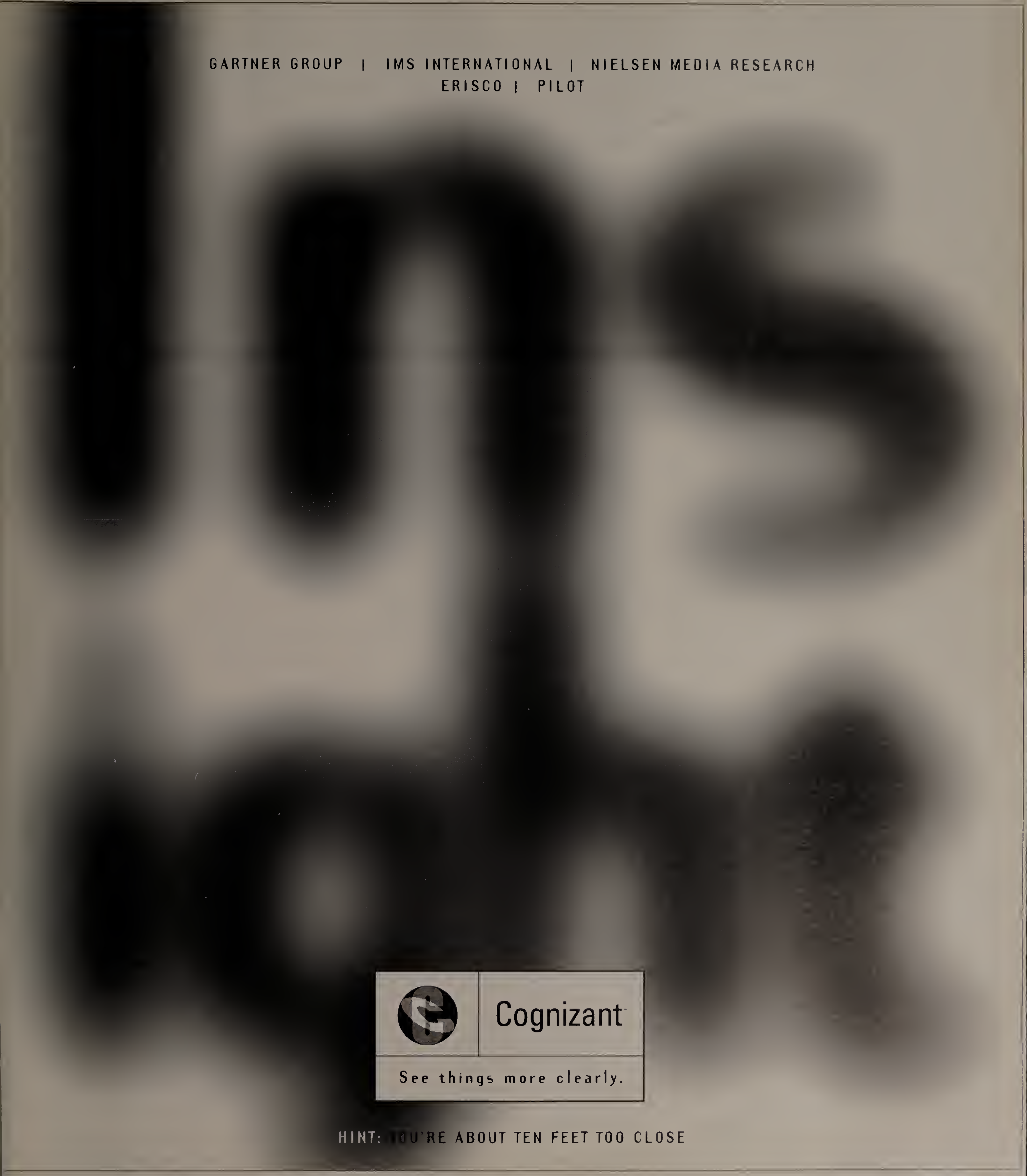

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# Forte revs up Web development tools

By Sharon Gaudin

Forte Software, Inc. hopes to carve out a bigger piece of the development pie by moving into the World Wide Web arena.

Forte, best known for high-end development tools, took its first steps toward the Internet earlier this year by releasing Forte Web SDK, which enabled Hypertext Markup Language (HTML) generation. Now it is integrating Java into the software developer's kit (SDK) and enabling developers to change applications without bringing down the server, said Ed Horst, a senior director of product marketing at Forte.

"We're starting to develop Web applications, and we'll be using Forte," said Mike Tremblay, chief information officer at Anderson Windows, Inc. in Bayport, Minn. "Forte is going to save us months in getting to the Web. Bringing HTML into Forte Web SDK was a piece of the vehicle, and Java is the engine for that vehicle."

Forte will support Visigenic Software, Inc.'s VisiBroker for Java, a client component required for Java interoperability with Forte servers. It will also sport Forte Applets, which are chunks of Forte code that can be downloaded from Forte servers.

"You can get powerful Forte applications running in a browser setting," Horst said. "That would enable the browser to take advantage of business services that have been tested and built already."

Tracy Corbo, a senior analyst at International Data Corp. in Framingham, Mass., said, Forte's "first step to the Web was HTML generation, and now they're opening up to more direct connections. ... It's a great move for them."

> "Forte is going to save us months in getting to the Web."
>
> *—Mike Tremblay, CIO, Anderson Windows, Inc.*

But Corbo also said information systems managers will take special note of Forte's addition of Business Server Plug-Ins. These are modules of code that can be added without bringing down the server.

"If I'm on the fly and I want to make a change to my applications, it's not a problem now because I don't have to take my server down," she said. "For somebody like New York City's 911 [department], which uses Forte, it's really, really important to never be down."

Corbo said these additions should bolster Forte, which is quickly gaining mind share in the high-end development market where it competes against companies such as Dynasty Technologies, Inc., Passport Corp. and Unify Corp.

The Java generation capabilities, Forte Applets and upgrading features will be part of Version 3.0, which is expected in the second quarter of 1997. Prices range from $4,000 to $6,000.

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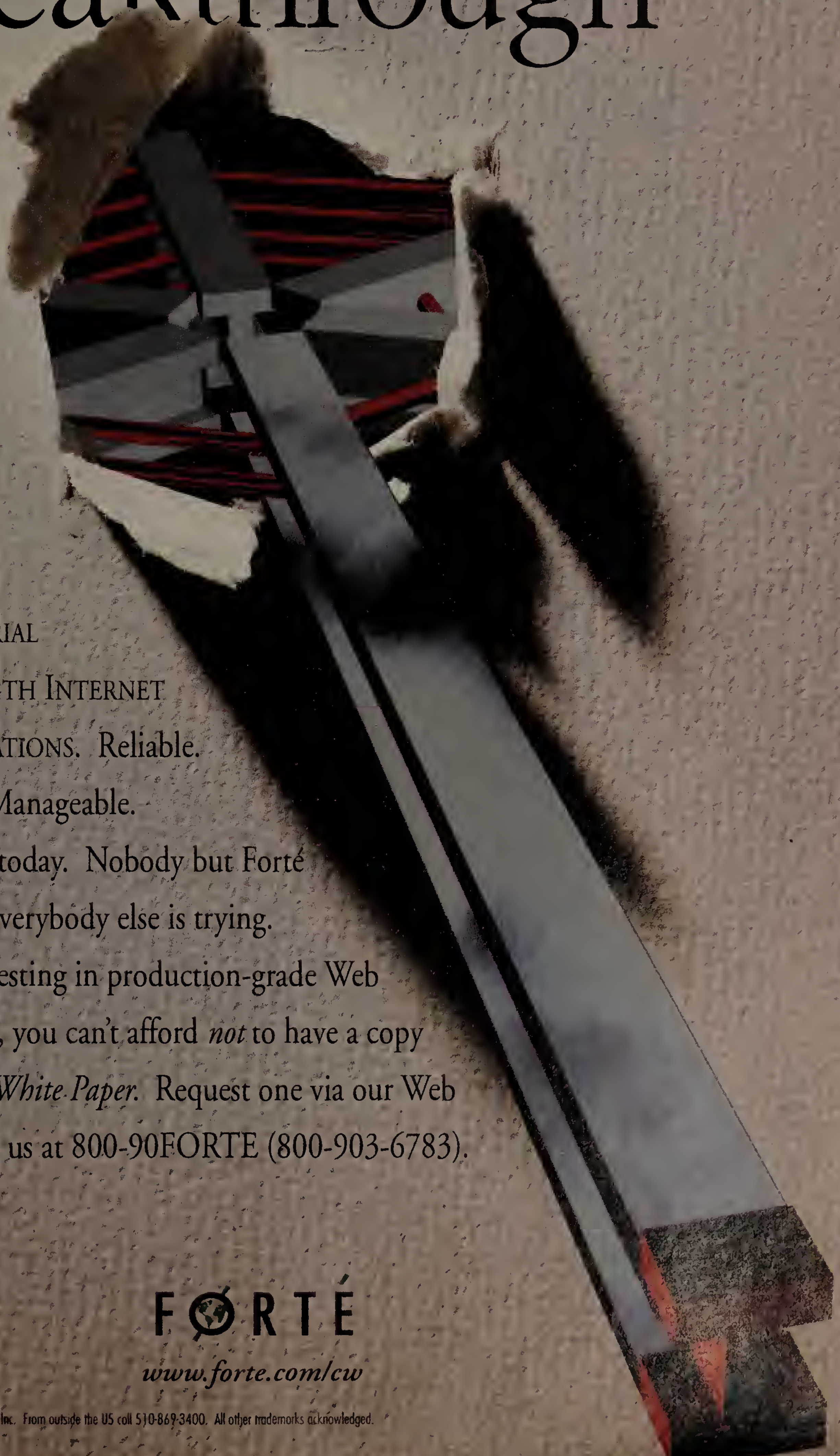

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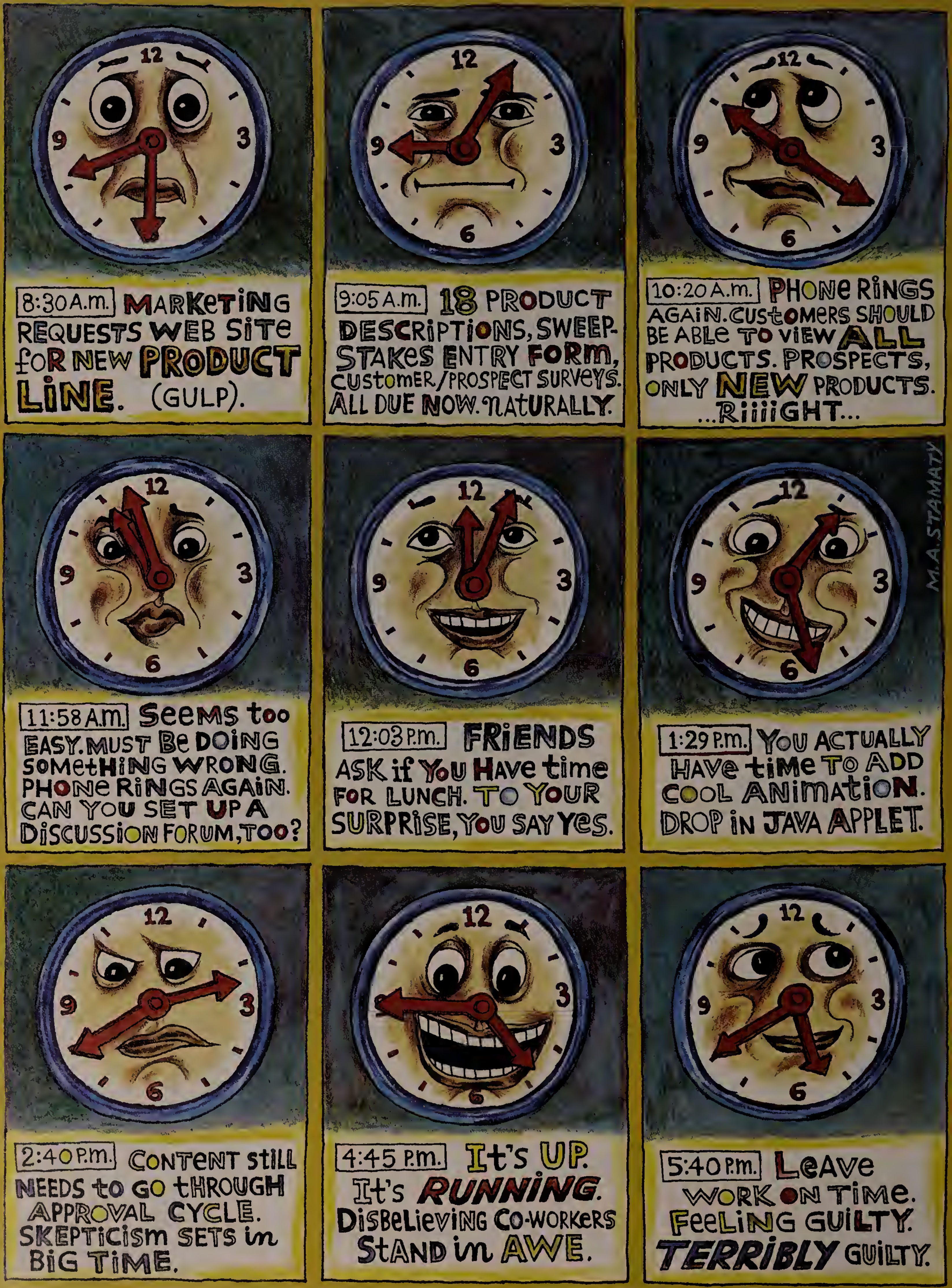
8:30 A.m. MARKETING REQUESTS WEB SITE FOR NEW PRODUCT LINE. (GULP).
9:05 A.m. 18 PRODUCT DESCRIPTIONS, SWEEPSTAKES ENTRY FORM, CUSTOMER/PROSPECT SURVEYS. ALL DUE NOW. NATURALLY.
10:20 A.m. PHONE RINGS AGAIN. CUSTOMERS SHOULD BE ABLE TO VIEW ALL PRODUCTS. PROSPECTS, ONLY NEW PRODUCTS. ...RIiiiGHT...
11:58 A.m. Seems too EASY. MUST Be DOING SOMETHING WRONG. PHONE RINGS AGAIN. CAN YOU SET UP A DISCUSSION FORUM, TOO?
12:03 P.m. FRIENDS ASK if You Have time FOR LUNCH. TO YOUR SURPRISE, YOU SAY YES.
1:29 P.m. YOU ACTUALLY HAVE time TO ADD COOL ANIMATION. DROP IN JAVA APPLET.
2:40 P.m. CONTENT STILL NEEDS to GO THROUGH APPROVAL CYCLE. SKEPTICISM SETS in BIG TIME.
4:45 P.m. It's UP. It's RUNNING. DisBelieving Co-WORKERS STAND in AWE.
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# MCI/BT to expand global networking

By Justin Hibbard and Kim Girard

The merger of MCI Communications Corp. and British Telecommunications PLC may usher in an era in which rich and poor companies alike can afford global internetworking.

The merger will save the companies a combined $850 million over the next five years, resulting in "very competitive" prices, said Fred Briggs, chief technology officer of Concert, the name of the merged company.

Customers can expect Concert to offer its services at prices well below what MCI and BT offer individually. Savings will result primarily from joint software development and eliminating duplication in the companies' networks, Briggs said.

### Tough task

The merger requires approval from the European Commission as well as the Federal Communications Commission, which must rule that the deal is in the public interest. If approved, pulling the two networks together won't be easy.

Users said they look forward to the services Concert might provide. "Competition is always good," said Robert Prophet, systems network administrator at the National Weather Service in Bohemia, N.Y. "Now, AT&T has someone on their level, battling on their ground. It's like someone stepping up to the plate and battling against Microsoft."

Ronald West, president elect of the Communications Managers Association, questioned why BT, which already owned a stake in MCI, felt the need to buy the entire company.

SETH AFFOUMADO

**Concert CTO Fred Briggs** *says the MCI/BT merger will save the combined company $850 million over the next five years*

But, he added, "I hope the net result is that we see better pricing and reliability. It's certainly a major step toward a competitive environment."

**Telecommunications mergers**

"It's great, it's exciting," said Sue Ann Rush, telecommunications manager at Providence College in Providence, R.I., and chairman of the New England Telecommunications Association. "There's more choices, more competition. I'm really looking at services."

Concert will focus on providing a managed, global network for businesses that want to operate intranets.

# Oracle branches out

## Database vendor reorganizes to deliver broader product line

By Craig Stedman
SAN FRANCISCO

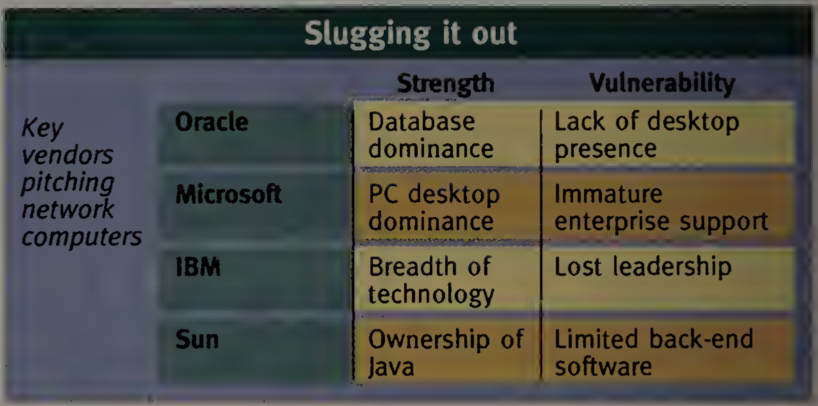
Oracle Corp. wants to cash in on the emergence of network computers by becoming a vendor that can be all things to all people.

But first it has to come up with more unified product, marketing and sales approaches, said users who attended last week's Oracle OpenWorld conference here.

Oracle executives conceded that its database, tools and other software products are still known largely on their individual merits rather than as part of an integrated whole. The company is trying to change that by making a series of organizational moves designed to present one face to customers.

Most users interviewed at the conference said they appreciate Oracle's willingness to mix it up with Microsoft Corp. on a wider scale. But several added that Oracle is still in the formative stage when it comes to putting everything together.

"You can tell that there's an emphasis on that, but they're kind of in catch-up mode at this point," said John Webb, manager of information technology at the petroleum services unit of Williams Energy Group in Tulsa, Okla.



**Slugging it out**

| *Key vendors pitching network computers* | | Strength | Vulnerability |
|---|---|---|---|
| | **Oracle** | Database dominance | Lack of desktop presence |
| | **Microsoft** | PC desktop dominance | Immature enterprise support |
| | **IBM** | Breadth of technology | Lost leadership |
| | **Sun** | Ownership of Java | Limited back-end software |

Webb's operation relies on Oracle databases, but to date, it has shied away from using the company's other products. For example, he said, Oracle's development tools haven't been as robust as rival offerings, although that may change as Oracle's Developer/2000 software matures.

### Tide turning

Ray Lane, Oracle's president and chief operating officer, was quick with the mea culpas during a presentation to reporters and analysts. "We haven't proved to the world that we can deliver technology as a whole with services wrapped around it," he said.

Microsoft does a better job of tying its software together in bundles, Lane said. "That's the way we want to start going with our products," he said.

Toward that end, Lane said Oracle is taking the following steps internally:

- Developing software stacks aimed at specific vertical markets, such as consumer packaged goods and financial services.
- Combining its sales and consulting personnel into worldwide vertical market business units scheduled to be in place next June.
- Creating field teams of up to 15 people to handle big customers that don't fit into any of the targeted verticals.
- Imposing a companywide process for planning product releases.

Even though Oracle is branching out into uncharted waters such as network computers and desktop applications, it is doing so with "a totally database-centric view," said a technical services manager at a utility company. "If they continue to keep that focus, I don't think they'll go off track," added the manager, who requested anonymity.

But other users weren't so sure. "Oracle has to be careful about what's within their grasp and what isn't," said Rick Timm, assistant vice president of systems architecture at Provident Mutual Life Insurance Co.'s operations center in Wilmington, Del.

### Introductions

Product announcements made at the Oracle OpenWorld conference included the following:

- **Oracle** introduced software that lets its Express Server multidimensional engine do online analytical processing against data stored in an Oracle7 relational database.
- Seven vendors introduced or detailed plans for developing network computers based on a hardware reference design released earlier this year by Oracle's Network Computer, Inc. subsidiary.
- Oracle didn't officially unveil its Oracle8 database or its object-based Sedona development tools, but it demonstrated test versions of the products. — *Craig Stedman*

# Lotus lets Java play with Domino

By Tim Ouellette

Users of Lotus' Domino server will soon get to expand their horizons with a slew of development options centered around the Java development language.

This will make it possible to simplify how developers deliver applications written for the Domino server and how users access those applications.

Last week at the Domino Web Developers' Conference in Anaheim, Calif., Lotus Development Corp. announced that it will open the Domino development environment to Sun Microsystems, Inc.'s Java, ship special Java applets and class libraries and standardize on the JavaBeans protocol.

JavaBeans is a standard that lets Java applets interact. Lotus will use applets to bring pieces of Notes' advanced client functionality to World Wide Web browsers that access a Domino server.

Domino is a Notes server that also natively supports Hypertext Transport Protocol and Hypertext Markup Language, thus acting also as a Web server. Right now, users can write Notes programs using C, C++ and Microsoft Corp.'s Visual Basic.

"But people would prefer to move in the Java direction on Domino because they could move beyond just Domino development," said Alan Baren, a manager at Coopers & Lybrand in New York.

There are still bumps to be smoothed out. For example, Lotus officials noted there was a bug in a beta release of Domino 4.5 that sized Java applets incorrectly on a Web page.

Lotus will also bundle both Microsoft's Internet Explorer and Netscape Communications Corp.'s Navigator browsers in upcoming versions of the Notes client. For users not on a TCP/IP network, Lotus will still ship its Notes Navigator browser.

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# Computer Industry

## Technology stocks rise on defeat of Proposition 211

By Justin Hibbard

No resignations. No shuttered companies. No mass exodus from California. It was just another sunny week in Silicon Valley after Proposition 211, a measure that would have made it easier for shareholders to sue technology companies, was defeated.

If the measure had passed, Silicon Valley might never have been the same, according to some opponents of the proposition.

"All hell would have broken loose," said Boris Feldman, a lawyer at Wilson, Sonsini, Goodrich & Rosati in Palo Alto, Calif., which represents several high-tech companies. "Those [companies] that were incorporated in California were all going to incorporate in Delaware. And all our clients felt their nonemployee directors were going to resign."

Beyond that, customers of Silicon Valley companies would have noticed a sudden scarcity of product road maps and forward-looking information, said Chuck Mulloy, a spokesman at Intel Corp.

"It would have caused us to reevaluate all of our communications," he said. "When you make a forecast, you leave an open forecast in place until the end of that quarter. An open forecast increases possibility of risk."

**Contributors to the effort to stop Prop. 211**

| | |
|---|---|
| Intel | $500,000 |
| Sun | $500,000 |
| Oracle | $300,000 |
| IBM | $250,000 |
| Hewlett-Packard | $250,000 |
| Compaq | $250,000 |
| Dell | $250,000 |
| Apple | $100,000 |

### Intel cautious

Intel announced Oct. 7 that it would cease making any more forward-looking statements pending the outcome of the election.

The company's third-quarter earnings report released Oct. 14 lacked the customary projections for the next quarter.

After Proposition 211 lost last week, Intel released its fourth-quarter outlook, complete with predictions for revenue, gross margins and expenses. And technology stocks rose in general.

Proponents of 211 said technology companies exaggerated the risks.

"As long as you make forward-looking statements that are made in good faith and based in fact, you had nothing to fear from 211," said Sean Crowley, communications director at Citizens for Retirement Protection and Security in Los Angeles.

## Netscape warns investors of threat from Microsoft

By Kim S. Nash

Netscape's grip is going to slip.

Not only has the company acknowledged that it expects to lose ground to Microsoft Corp. in the World Wide Web browser and server markets, but Netscape Communications Corp. also considers the threat serious enough to warn investors about it.

In routine financial documents filed last month with the Securities and Exchange Commission, Netscape outlined the potential effects of the Microsoft Mack truck bearing down on it.

### Mounting competition

Microsoft's free Internet Explorer browser and Internet Information Server, combined with Microsoft's huge installed base, "has significantly increased the competitive pressures on [Netscape]," according to papers filed Oct. 30.

The pressure could force Netscape to cut prices on its Navigator browser and SuiteSpot Web servers, Netscape warned.

"If any future price reductions do not generate sufficient increases in the volume of software licenses, the company's operating results will be materially adversely affected," the Mountain View, Calif., company added.

Although lower prices might be unpleasant for Netscape, users said they wouldn't mind a bit.

"Web software isn't that expensive anyway. Who wouldn't want to pay less if they could," said Stuart Greenfield, a systems analyst at the Texas Comptroller of Public Accounts in Austin.

Moreover, pricing on Netscape's servers has already been slashed at least once.

Last year, Commerce Server was $5,000 and Communications Server was $1,495, for example. Current versions, which have been renamed Enterprise and FastTrack, are $995 each.

Navigator, meanwhile, has remained stable at $49.

Microsoft's ability to offer its Web software for free will inevitably eat into Netscape's market, said David Belsky, a senior technical analyst at Chubb & Son, Inc., a large insurance firm in Warren, N.J.

But the Web's rapid-fire release schedule may also work against Web software companies in general, he said, because it lets information systems managers continually reevaluate buying decisions.

For example, for Chubb's intranet users, "we're distributing Netscape [Navigator] right now. We'll see what happens" in a few months, Belsky said.

Although Netscape maintains a dominant share in Web servers and browsers, Microsoft has made inroads, according to a survey last quarter by *Computerworld*'s Information Management Division in Framingham, Mass. (see chart).

**Browse and switch**

Percentage of users surveyed who plan to switch browser vendors in the next year

| CURRENT VENDOR | |
|---|---|
| Netscape | 72% |
| IBM | 6% |
| National Center for Supercomputing Applications | 6% |
| Microsoft | 5% |
| CompuServe | 3% |

Base: 154 IS professionals planning to switch their primary browser vendors

Source: *Computerworld's* Information Management Division

## Microsoft settles inventor's lawsuit

### Other vendors bowing to audio signal patent

By Kim S. Nash

Patent No. 4,124,773 has been good to Robin Elkins.

In the past decade, the inventor and president of Hollywood, Fla.-based Elk Industries, Inc. has sued more than 25 big industry players for allegedly infringing on his patent for technology that transmits audio signals over networks.

Most defendants have eventually agreed to license Elkins' technology — the latest being Microsoft Corp.

Opting to settle a 5-month-old suit that accused it of violating Elkins' 1978 patent, Microsoft has licensed the technology for an undisclosed sum said to include royalties.

Microsoft declined to comment.

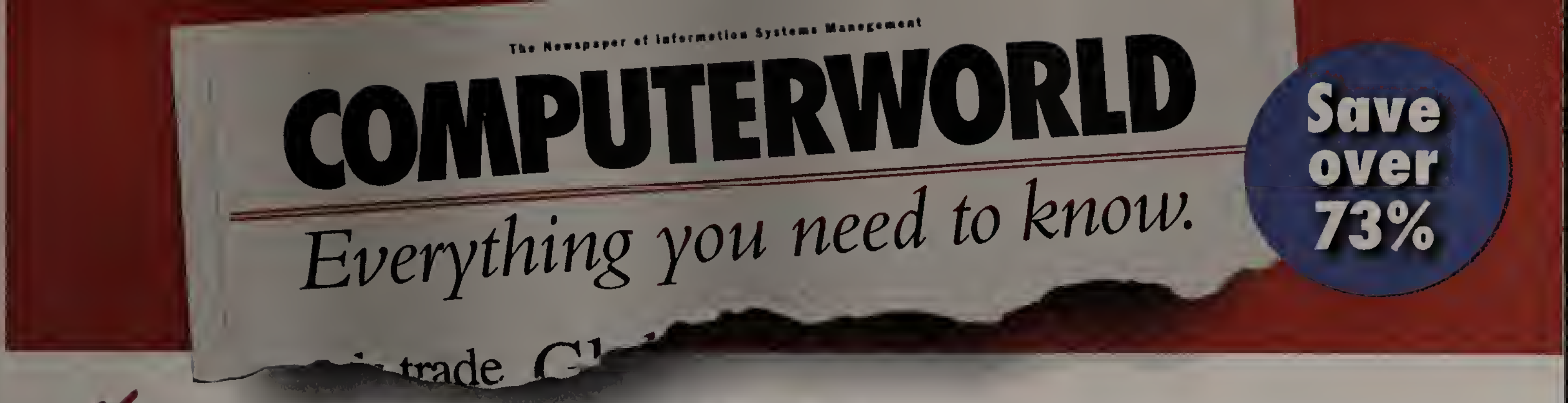
In May, Elkins sued Microsoft and roughly two dozen other Internet-related vendors for stepping on his invention. He created a technology for translating audio signals between analog and digital formats and sending those signals over and storing them on networks.

World Wide Web browsers from Microsoft, Netscape Communications Corp. and others, Elkins said, violated his rights by letting users send and receive audio via the Internet.

He also sued online services providers, such as Prodigy Services Co.

Elk Industries is negotiating with Netscape and Prodigy for similar licensing deals, Elkins said. They are expected to be signed within the next few weeks.

Elkins' patent on technology for moving and translating audio signals over networks expired last Friday, but as long as he put alleged infringers on notice before then, Elkins can still pursue claims.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| E. 500 – 999 | ☐ | ☐ |
| F. 100 – 499 | ☐ | ☐ |
| G. 50 – 99 | ☐ | ☐ |
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| J. 10 – 19 | ☐ | ☐ |
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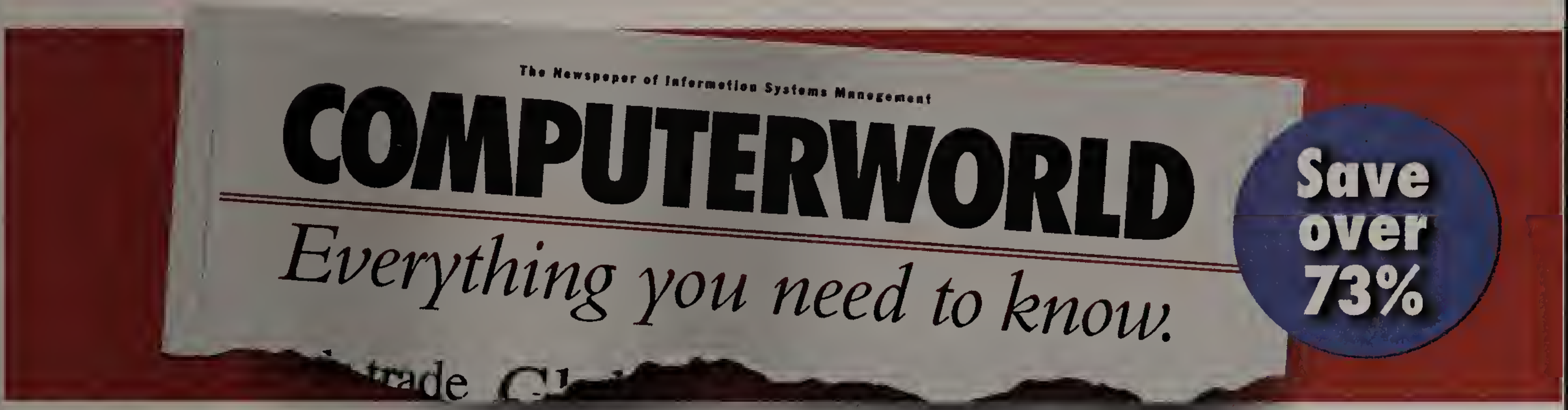
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| D. 1,000 – 4,999 | ☐ | ☐ |
| E. 500 – 999 | ☐ | ☐ |
| F. 100 – 499 | ☐ | ☐ |
| G. 50 – 99 | ☐ | ☐ |
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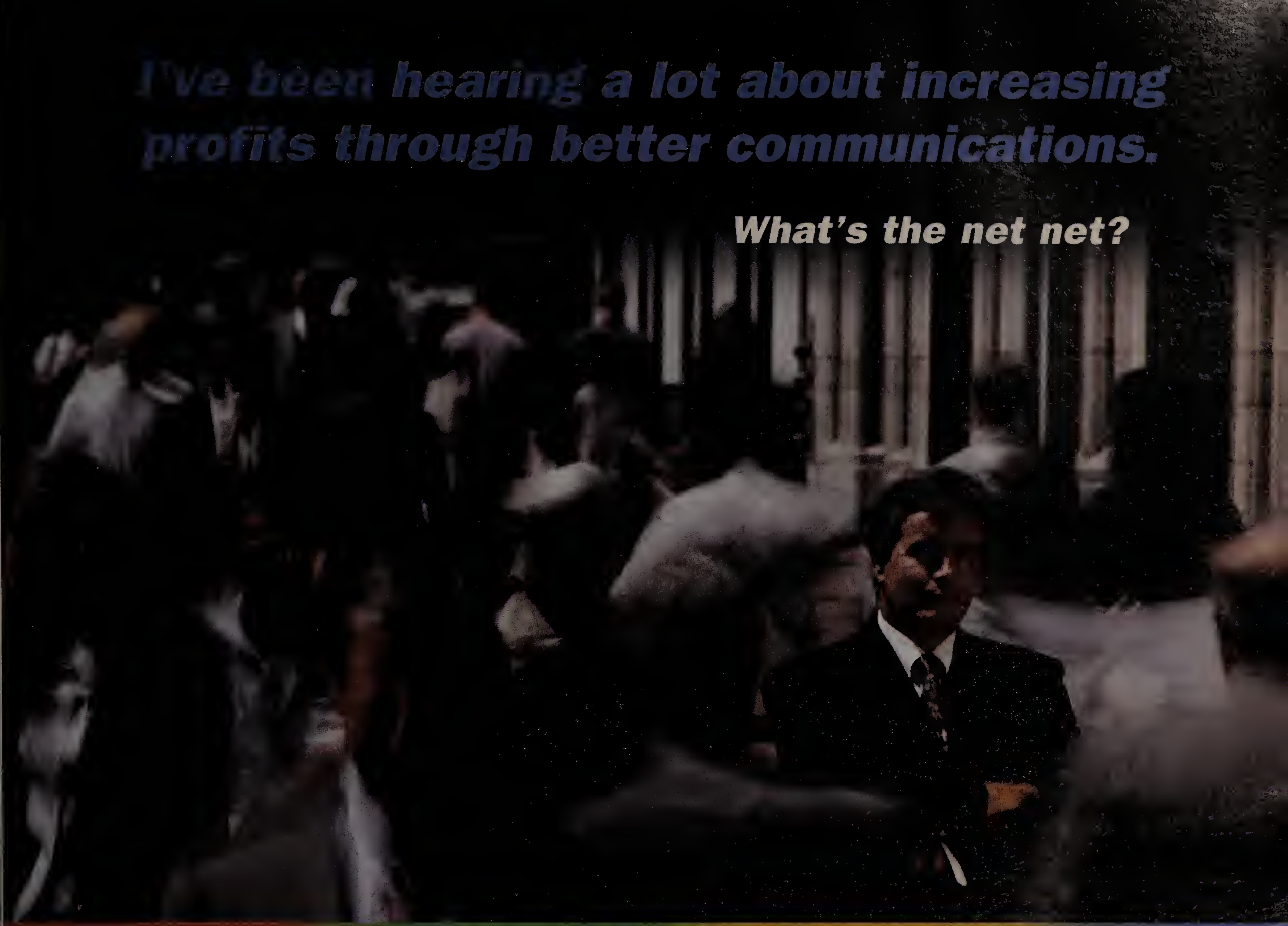
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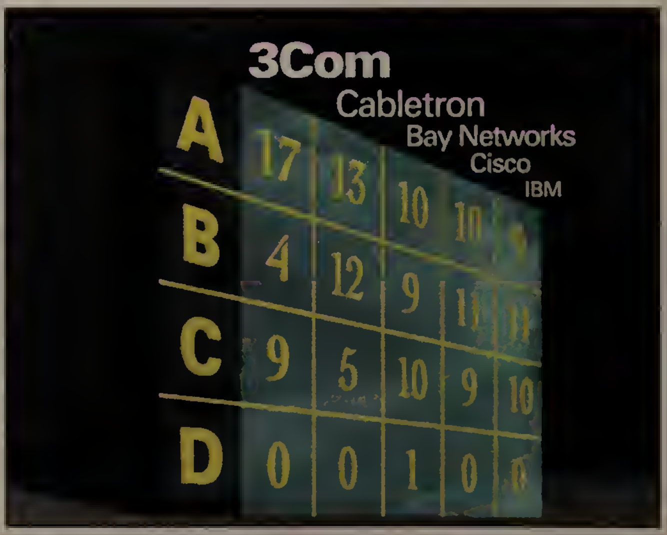

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**Opinion**

# Deja vu. Deja vu.

It was only a scant five years ago that the PC industry's new order declared client/server computing ready to tackle bloodline, industrial-strength computing tasks.

Mainframes, they said, would go the way of paper punch cards. Networks of low-cost PCs would assume the processing of everything from key sales data to payroll. Well, for a variety of reasons I won't belabor here, it never happened.

Now the renegades are touting the Internet and its direct descendant, the intranet, as the next IT cure-all. They promise ubiquitous information access, application portability, open communications protocols, easy-to-manage clients and centralized systems administration. All this, they say, will decrease cost of ownership.

But as in client/server's earliest days, network computing's hype exceeds its reach. The obstacles include:

- Low-end PCs that can't optimally run a new generation of so-called thin-client browsers that weigh more than 10M bytes.
- LANs and WANs that require fatter pipes, better segmentation and switching technology to support anything more than the lightly trafficked applications.
- Painful migrations for all but C and C++ programs.
- Nonexistent or immature application and network systems management products and performance monitoring and tuning tools (deja vu).
- Skills. How many intranet experts do you know?
- Culture. Power PC-ites will fight to stay empowered.

And then there are misbehaving Java applets, scalability questions and security concerns.

Building the requisite infrastructure will cost some bucks, no doubt. Enough, perhaps, to wipe out projected — and untested — cost-of-ownership advantages?

Clearly, network computing has established a beachhead in self-help HR, internal help desk and data entry, database lookup, retrieval and reporting applications. And certain pioneers are blending intranets with the Internet for electronic commerce and collaboration.

But learn from others' mistakes. Too many IS folks tried to be heroes with client/server. Anyway, Gartner Group will probably release numbers that reveal that network computing does little more than shift expenses back to the server.

Alan Alper

*Alper is Editor,* Computerworld *Magazines Group, a recovering client/server addict and a notorious naysayer.*

**Letters to the editor**

## Market can support both PCs and NCs

David Coursey's apology to Larry Ellison ["Egad, Larry Ellison just might be right!" CW, Sept. 23] is just the beginning of what is certain to become an orgy of crow-eating.

Does anyone see the possibility of less-complex PC hardware and software anytime in the future?

With many millions of PCs in the corporate world that require frequent upgrades and continuing support, it's fruitless to compare the $500 initial cost of network computers with the $1,000 to $5,000 cost of a corporate PC. It's the cost of support — zero dollars compared with about $1,000 per PC per year — that will be the real motivating factor.

Does this signal the death of the PC? Of course not. The market is large enough to support both.

Advocates of the network computer are going to be proved right by the marketplace, no matter what industry leaders say. So if we can't fight 'em — and we can't — we'd better join 'em.

*Sy Bosworth*
*S. Bosworth & Associates*
*Plainview, N.Y.*

## Engineer debate is petty

Julia King's article ["Engineer title trips up computer pros," CW, Sept. 23] brought home yet again just how petty some of us can be.

The National Society of Professional Engineers (NSPE) doesn't want anybody to use the title "engineer" unless he practices particular "approved" disciplines.

The NSPE says this is to protect the public from fraud. It sounds to me like just another guild making it hard for others to take part in order to enhance its own position in the scheme of things.

My solution? Change CNE to Certified Network Experts. Is there, by any chance, a law against calling yourself an expert? Better keep an eye out for the National Society of Professional Experts.

*James Thomas*
*WOSCA Shippers Cooperative*
*Seattle*
*James.Thomas@*
*Wosca.e-mail.com*

## 'Unfeeling' column

About Brian Jaffe's "Disgruntled E-mail worker on rampage" column [CW, Oct. 21]: Was this supposed to be funny? If Jaffe wants to parody something, he needs to pick a topic that doesn't have to do with people being killed, maimed and crippled.

It was unkind, unthinking, unfeeling and unfunny. You owe your readers an apology, and you need to find another columnist.

*Shay Lynn*
*Denver*
*103727.2235@compuserv.com*

## Java is an orange, ActiveX an apple

I was interested to read Ross M. Greenberg's conclusions in his column "Java or ActiveX? Maybe both" [CW, Sept. 23]. There were, however, several points raised that I believe were inaccurate.

Java is a computer language and provides more than just an applet class and some run-time libraries.

Greenberg makes a common mistake when he talks about Java security: The security framework discussed is a feature of the applet class, not of the language. ActiveX is a set of application programming interfaces on a component framework, Distributed Component Object Model. It is more a middleware implementation than anything else.

Greenberg makes one extremely important point. If you're thinking of downloading any executable program at all from the Internet, you can't be too careful. No security mechanism is completely watertight, and there's no substitute for common sense.

*Neil Ward-Dutton*
*Editor*
*Ovum Evaluates 4GLs and Client/Server Tools*
*London*

■ Computerworld welcomes comments from its readers. Letters shouldn't exceed 200 words and should be addressed to Maryfran Johnson, Executive Editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.

*Tim Berners-Lee*

# Don't turn the Web into a Tower of Babel

Donna Coveney/MIT

**The "father of the Web" discusses Web reliability, pricing and standards.**

*Tim Berners-Lee was born in London to parents who developed one of the earliest commercial computers. He grew up playing with five-hole paper tape and building computers out of cardboard boxes. In late 1990, he wrote the software that created the World Wide Web, the hyperlinked portion of the Internet. The "father of the Web" recently spoke with Viewpoint Editor Mitch Betts about the Web's future.*

**Q: Are you concerned about a collapse of the Internet infrastructure?**

**A:** I'm concerned in that it's happened already. At the places that I browse, I find that it's not my modem connection that's holding me up, it's the international connections that are overloaded. That's inevitable whenever you have something where people pay a certain amount for all they can eat.

We noticed this a long time ago when we had a Web server which was meeting its maximum load, so we changed the software so it would run five times as fast. What happened was that we got five times as many hits, immediately. Once people find that browsing is easy, they do it more and more.

I'm not concerned about it in the long run, though. The good news is that the amount of bandwidth it takes to do Web browsing — compared with a telephone conversation — is very small. Most of the time, you're just sitting there with the modem idle while you're reading. As the telecommunications network evolves to handle video-on-demand, it should be able to handle a bit of Web browsing. The cost of bandwidth for Web browsing should be lost in the noise.

Ralph Kelliher

**Q: Do we need congestion pricing for the Internet?**

**A:** In most markets, there is a need for different pricing models and different qualities of service. No single model will work for everybody. Yes, it is important to be able to pay more for better quality.

**Q: What will it take to make the Web industrial-strength?**

**A:** Faster response and greater reliability are the main two steps. In the long term, we'll be looking at architectures that automatically replicate content in different places to improve both response time and reliability.

**Q: But I know you're concerned about fragmentation and incompatibilities.**

**A:** Do you remember what it was like before the Web? Do you remember what it was like to try to get information, but it was in a different format, and the internetworking didn't work, and you had to go down the hall to get a floppy disk, but you couldn't read the floppy disk?

Now consider 15 different browsers, and each Web site says it's best viewed with this or that browser [because of proprietary features]. Suddenly there isn't just one World Wide Web, but there are a whole lot of Webs.

When I see a site that says, "Best viewed with XYZ browser," I see a webmaster just yearning to go back to the situation where you can't transfer data [because of incompatibilities]. It's shortsighted. Instead, I suggest they say, "Best viewed with a browser that meets the HTML 3.2 standard." Otherwise, we'll be back to the Tower of Babel.

Berners-Lee is director of the World Wide Web Consortium (www.w3.org) and principal research scientist at MIT's Laboratory for Computer Science.

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*Michael Schrage*

# Why stop at knowledge management?

**If you think "knowledge management" is an IS headache, get ready for "wisdom management."**

Pick up *Fortune*, *Forbes* or *Fast Company* and you'll discover the Next Big Trend that will make life a living hell for information systems managers: knowledge management. Corporation after corporation is naming a "chief knowledge officer" to take charge of the firm's intellectual capital. Chief information officers are increasingly working with — or mutating into — CKOs.

Why not? Knowledge is a key corporate asset that needs to be leveraged, right? Who better to create knowledge management infrastructures than the fabulous folks who handle information management? After all, what is knowledge but value-added information? Indeed, wasn't data processing the forerunner of information management? Ah, the good old days.

**Foolish wisdom management could be worse than ignorant information management.**

Today's IS function should be anticipatory, aggressive and proactive. Knowledge management is clearly just a phase — a transitory link in the value chain of organizational productivity. Knowledge management simply doesn't go far enough. We need to have the courage and creativity to look to the management destiny beyond knowledge management. I'm certain I know what that destiny is: We'll soon have chief wisdom officers!

Wisdom Management® will be more important than knowledge management because wisdom trumps knowledge. A wise CEO will surely make better decisions than a merely knowledgeable one. A wise company inspires greater trust and loyalty from employees and customers than one that simply has more knowledge. Why develop expert systems when we should be building "wisdom systems"? Why make better knowledge management the organizational centerpiece when what we really aspire to is greater wisdom?

Let's cut to the intellectual chase: Leapfrog knowledge management and move directly to Wisdom Management®. Consider this thought experiment: Whenever you see the word knowledge, substitute the word wisdom.

The design challenge becomes infinitely richer. Instead of an organization identifying key "knowledge assets," the firm should locate and cherish its "wisdom assets." Instead of asking what new knowledge is central to generating innovation, the firm should ask what new wisdom will spark new products and services. Shouldn't your company try to train wise leaders rather than just knowledgeable managers?

But what, you ask, is the difference between knowledge and wisdom? Well, it's not unlike the difference between data and information or information and knowledge. Most managers can tell the difference between wisdom and knowledge with the same confidence they distinguish between information and knowledge.

Of course, one must be careful about instantiating conventional wisdoms into your Wisdom Management® systems. But this is just wisdom's counterpart to the perennial data-integrity challenge. Clearly, companies need to strategically manage their wisdom data, wisdom information and wisdom knowledge with rigor. Foolish wisdom management could prove even more disastrous than ignorant information management. But who would argue that well-designed Wisdom Management® systems will deliver superior results to comparably designed knowledge management systems?

That said, IS has a professional obligation to resist top management pressures to build new systems and applications around this knowledge management fad. Responsible leadership should look beyond knowledge. Let's resist the tactical blandishments of knowledge management and commit to the strategic benefits of Wisdom Management®. Isn't that the wisest choice?

Schrage is a research associate at the MIT Media Lab and author of *No More Teams!* His Internet address is schrage@media.mit.edu.

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# NC: Use where dumb is an asset

All talk about network computers can be divided into three parts: the real, the symbolic and the blatantly self-serving.

There is a real market for network computers, but it isn't as replacements for corporate or home PCs. Network computers mainly will be used where being dumb is an asset. No jokes, please. A sealed, diskless device is ideal for libraries, schools, airports, hotels, bank lobbies and other public areas. You don't want customers at a sports bar loading programs or data.

By expanding public access, network computers will help society move along its long march toward universal Internet service. Whatever additional role network computers play in certain fixed-function enterprise applications will prove secondary — and will take much time to develop.

This substantial new contribution is actually less important than the underlying symbolic message. Network computers deserve the hype they get because they perfectly encapsulate the information technology industry's transition to a network-centric era. Even as PCs continue to dominate the desktop, the incremental investments in technology made by corporate information systems departments increasingly will go toward enhancing the network, not the desktop platform.

In other words, Pentium Pro Windows NT desktops with 32M bytes of memory will be less of a customer priority than faster servers, more bandwidth and related enabling software.

...........

*David Moschella*

**Suddenly, fat-client vendors have gotten thin-client religion.**

Already, many customers question the value of moving to Windows 95 and its related applications. A shift from a three-year to a five-year life cycle for PCs would do much more for the typical enterprise customer than network computers ever will.

Unfortunately, those important real and symbolic dimensions have often been drowned out by the unashamedly self-serving claims of some of the industry's leading vendors.

Sun Microsystems, the original "fat client" vendor, now faces a threat from NT workstations. With Clintonesque opportunism, Sun has discovered the virtues of the "thin client" approach. Oracle, realizing it could be Microsoft's next big enterprise target, suddenly feels compelled to try to overthrow the established PC order.

Even Intel and Microsoft, which first trashed the network computer idea, are now trying to co-opt it with their NetPC vaporware. Microsoft's "zero administration" client sounds great and is a worthy goal, but don't be surprised if fat clients turn out to be the best way to get there. In the end, the NetPC is largely a defensive move. Microsoft and Intel are still in the fat client business.

With vendor credibility this low, customer skepticism will remain high.

Moschella is senior vice president of research at Computerworld, Inc. in Framingham, Mass. His Internet address is david_moschella@cw.com

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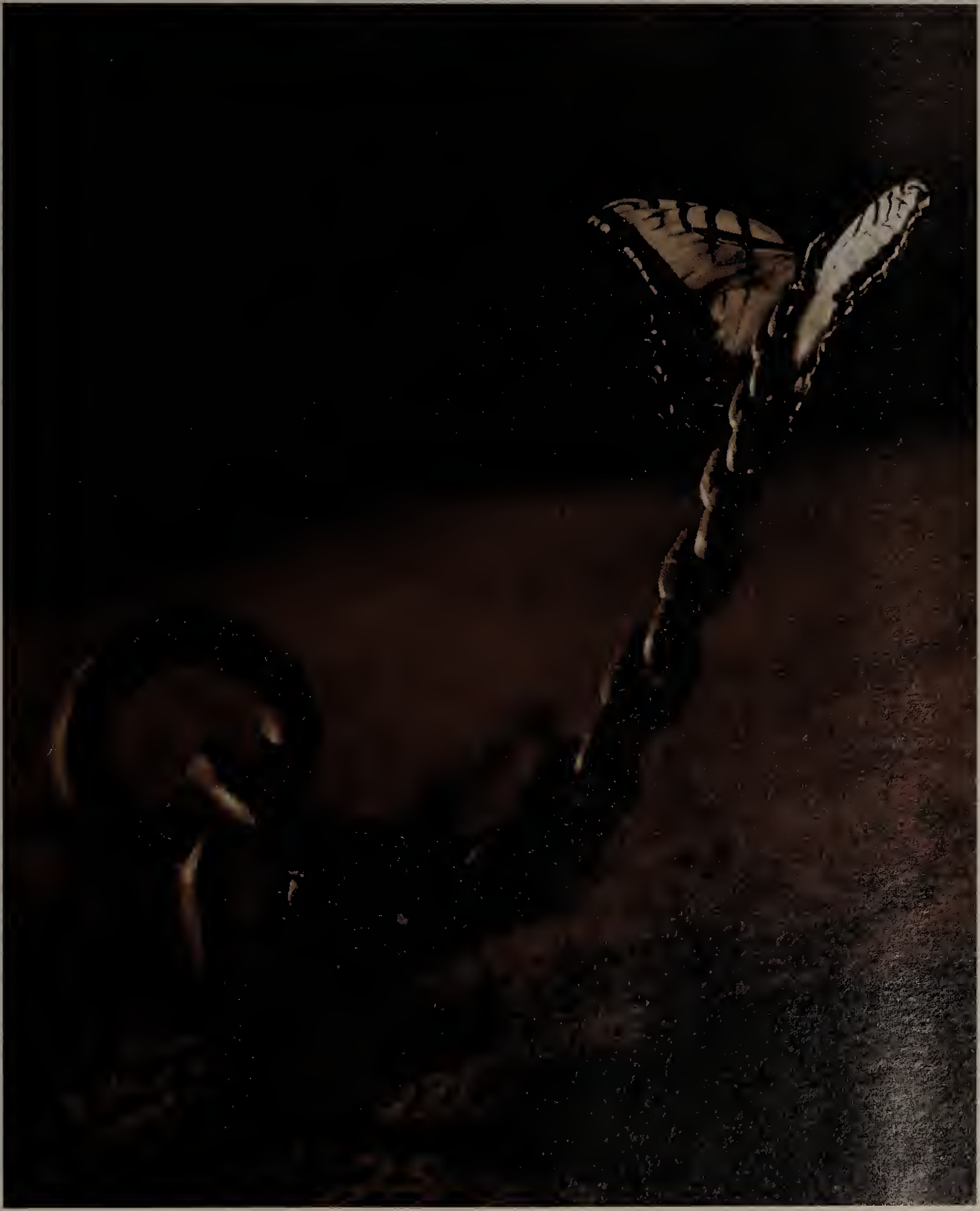

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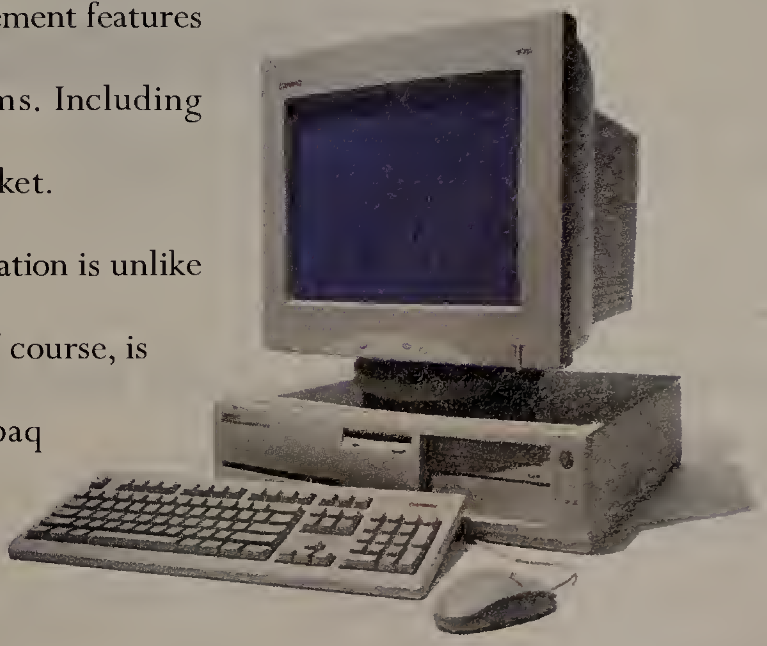

*So what's under the hood? 1–2 200MHz Pentium® Pro processors with NT 4.0, a 256K cache, up to 512MB of ECC DIMM memory, an Ultra-Wide SCSI controller, and advanced 2D/3D graphics accelerators.*

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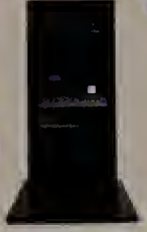

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But you won't have to make a trade-off between increased function and ease of use. The newest member of AS/400 Advanced Series, AS/400 Entry is among the easiest servers to install, use and maintain. And AS/400 has the lowest cost of use for small businesses over a five-year period, compared to leading LAN server platforms.*

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# Sun-compatible workstations pack 64 bits

By Jaikumar Vijayan

HAL Computer Systems, Inc., a manufacturer of Sun-compatible systems, last week announced two 64-bit workstations aimed at the high-end engineering design market.

The HALstation 375 and 385, two workstations based on the company's SPARC64-II processor, replace HAL's existing models and feature better graphics and 64-bit operating system support (see chart).

The promise of such 64-bit architectures lies in processor speed improvements, increased application scaling and configuration flexibility, analysts said. Users can take advantage of memory capacities and file sizes that are larger than those possible with 32-bit machines.

For example, HAL's new systems can support up to 3G bytes of main memory; most 32-bit architectures support a maximum of 2G bytes of memory. That increased capacity is particularly useful for high-end design and compute-intensive applications, analysts said.

"For customers in the electronic design space who have been working on SPARC-based systems, this offers a nice high-end capability," said Greg Weiss, an analyst at D. H. Brown Associates, Inc. in Port Chester, N.Y. "With 64-bit addressing, customers can avoid having to segment [their applications] into pieces and putting the results back together again."

**HAL systems,** *page 49*

**HALstation 385**

**Processor:** 161-MHz SPARC64-II
**Graphics:** Fujitsu AG-10E (optional)
**RAM:** 64M bytes to 3G bytes
**Hard drive:** 2G bytes
**Starting price:** $19,495

# Big iron rebounds

## Renewed demand continues; users cite mainframes' robustness

By Tim Ouellette

Users of large systems have gone to the polls and cast their votes — not always enthusiastically — for big iron.

Recent surveys show that most mainframe shops are buying new machines or ratcheting up processing capabilities of existing mainframes, continuing the turnaround that started last year (see chart). And 79% of respondents to a survey by Trish Information Services in Hayward, Calif., said they expect the renewed demand to be a long-term phenomenon.

"We don't want to put our scarce programming resources on just replatforming something that's already working" such as our mainframes, said Gerard Higgins, assistant vice president of data center and network resources at Nynex Corp. in New York. "So we never joined the mainframe-burning sessions in the first place."

But information systems managers still have some reservations about betting the house on the mainframe.

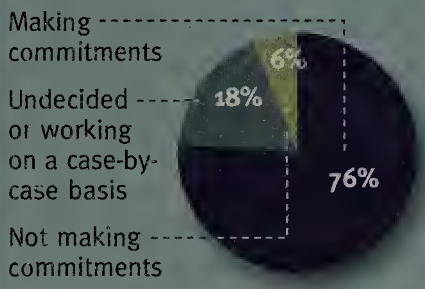
"We will try to steer clear of deploying new S/390 [mainframe] capacity," said an acquisitions manager at another telecommunications company. "But it is unavoidable because other technologies have not evolved enough yet."

For example, users who responded to a survey by International Technology Group in Mountain View, Calif., said a critical differentiator for mainframes is their ability to support larger applications, heavier workloads and more users than Unix servers.

**Big iron turnaround**

*Most mainframe shops plan to continue using their systems for new or overhauled applications . . .*

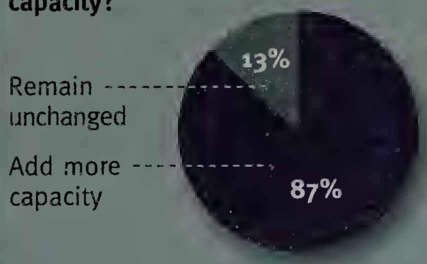
**What is your attitude toward new mainframe commitments?**



Base: 100 mainframe shops with at least 200 MIPS of installed capacity

*. . . still more will add capacity to existing systems by year's end*

**What are your plans for mainframe capacity?**



Base: 100 mainframe shops with at least 200 MIPS of installed capacity

Source: Trish Information Services, Hayward, Calif.

### Behind the turnaround

Observers said the return to growth in mainframe capacity stems from the following factors:

- A higher demand for transaction capabilities.
- The inability of client/server systems to handle heavy-duty data crunching.
- The opening up of mainframes to other systems so users don't need to rehost aging mainframe applications.
- A decrease in the price of mainframe processing power. Aberdeen Group, Inc., a consultancy in Boston, estimates the cost could drop to $10,000 per MIPS by next year.

And users can expect expanded service offerings from mainframe vendors as they seek to rely less on shrinking mainframe profit margins.

Companies such as Amdahl Corp. and IBM have transferred their experience in integrating mainframe systems into successful service businesses for large en-

**Big iron,** *page 50*

# Networked storage speeds data access

By Tim Ouellette

Users can put the pedal to the metal when accessing enterprise data.

Recent storage vendor product releases give users fast access to all data stored on a network. In the past, users had to wait for file transfers between legacy mainframe systems and newer client/server applications.

For example, as Pepsi-Cola General Bottlers, Inc. in Rolling Meadows, Ill., moves off the mainframe during the next eight months, it is using Encore Computer Corp.'s DataShare software to give users access to all mainframe and Unix systems data.

"The ease of use [DataShare] gives us relative to a conversion is amazing, especially from a timing point of view," said Dan Dvorak, vice president of information systems at the bottling company.

Encore in Fort Lauderdale, Fla., is simplifying use of DataShare by bundling the package with its line of Infinity SP stor-

**Networked storage,** *page 50*

**Everyone share**

Storage vendors are allowing users to get company data fast – regardless of where it is stored

| Vendor | Current strategy |
|---|---|
| **EMC** | Shipping SMTF, a $30,000 to $60,000 package |
| **Encore** | Now bundling its DataShare software into its line of Infinity storage products |
| **StorageTek** | Will ship Unix-to-mainframe backup software Central Archive Manager |
| **IBM** | Client input/output sockets, or CLIOS, software that provides high-speed data transfer between S/390 and RS/6000 systems |

IDC**INSiGHT**

# Successfully Migrating

Corporate America is fast embracing Windows NT workstation for its desktop computing as it seeks a true multitasking, robust, 32-bit OS with reliability, security, and high performance. The Pentium Pro, offering superior speed and performance, is far and away the preferred platform for NT. These were among the key findings of IDC's recent global survey of 1,500 corporate enthusiastic NT adopters and active evaluators.

International Data Corporation (IDC), the world's leading information technology (IT) research firm, recently surveyed 1,500 medium-sized and large corporations around the world about their advanced desktop PC usage and plans via in-depth telephone interviews. Primarily, the research analyzed how corporations are currently using and adopting advanced Windows NT/Pentium Pro systems and what users found as key drivers and constraints. The study focused on advanced adoption so that organizations adopting less than 10% NT systems among their total systems, within the next two years, were excluded from the survey.

The market momentum for NT/Pentium Pro systems will intensify over the next 3–18 months, especially among U.S. corporations. Key drivers for this upward migration include the accelerated price/performance improvements of the Pentium Pro; the increasing availability of 32-bit applications; and recent release and success of Windows NT Workstation 4.0. IDC predicts 1998 to be the pivotal cross-over year when U.S. Pentium Pro Processor PC U.S. sales will exceed Pentium Processor PCs overall, and when NT will surpass Windows 95 on desktops in large corporations.

### Key Advanced PC Study Findings

- By YE 1997, half said at least 50% of new PC purchases will be Pentium Pros.
- Corporate user plans by late 1997 include the following:
  - 150% increase in Windows NT
  - 50% decrease in Windows 3.X
  - 50% increase in Windows 95
- Within two years, the majority of internal application development will be 32-bit.
- Reliability, security, and performance are top reasons for choosing NT over Windows 95.
- Twenty-five percent of respondents will gradually roll out NT companywide; 50% will roll out NT selectively.
- Key NT applications are general office, software development, technical/engineering, customized business, and multimedia.
- Performance and speed are top benefits of running NT on Pentium Pro PCs.
- Cost, hardware requirements, and incompatibility with existing software/peripherals key barriers to adoption.

### Why Upgrade to Advanced PCs?

Corporate PC users are constantly seeking better CPU performance, more memory, faster data access times, and more powerful OS and application suites. In the late 1990s, technology continues to accelerate with more intensive requirements due to the increase in the size of applications and graphics-intensive files; expanded multimedia data types (color images, audio, and full-motion video); the inclusion of more software (Web browsers, utilities); and the constant IT mandates to cut costs and improve productivity. In addition, the tremendous growth in the Internet, Web, and corporate intranets is bringing ever-greater amounts of data to the desktop.

Recent and unprecedented price/performance improvements in advanced PC systems have whetted organizations' appetites. IDC PC pricing research indicates the cost of Pentium Pro systems will decline a full one-third to nearly half (or 33–47%) from the beginning to the end of 1996, depending on chip speed. As an industry example, consider the advanced desktop offerings in late 1994 vs. late 1996 from AST Computer. AST's high-end brand series has dropped in price by more than one-third, from about $4,300 to about $2,850 in estimated street price, while the overall performance offering has more than doubled. In short, there has never been a time in which corporations have needed advanced desktop PCs more, nor a time in which cost justification for upgrading has been stronger for the business enterprise.

### Pentium Pro—Platform for and to the Future

The Pentium Pro, Intel's sixth generation microprocessor family, released in late 1995, was specifically designed to optimize the performance of 32-bit code while maintaining backward compatibility with previous x86 code. In essence, the chip is a bridge between today's world, which predominantly uses 16-bit OS (Windows 3.X) and applications, and the emerging world of 32-bit OS (NT, Windows 95) and applications, which is fast becoming the industry desktop standard. The Pentium Pro also offers unparalleled speed and performance through its superscalar and superpipeline design; Intel's "Dynamic Execution," and its L2 "cache on-board" dual-chip module.

As prices further decline, IDC predicts that demand for Pentium Pro PCs will increase significantly, especially in the corporate environment. Current street prices for NT/Pentium Pro systems have now fallen to less than $3,000—within the range of most corporate IT budgets. Accelerating price competition and expanded product selection will continue through 1997, which will further fuel the market. IDC anticipates Pentium shipments will peak in 1996, and the Pro, with 15 million units, will surpass Pentium sales (13.9 million units) as the dominant PC platform in the total U.S. market by 1998 (see Figure 1).

### The Corporate Move to Windows NT

Migration to the 32-bit desktop enables true multitasking, improved stability, virtual memory, multiprocessing, and robustness. More than half (53%) of those IDC surveyed currently do 32-bit application development. Key drivers of 32-bit adoption cited by the IDC user base included new application availability, price declines, performance gains, and the success of NT

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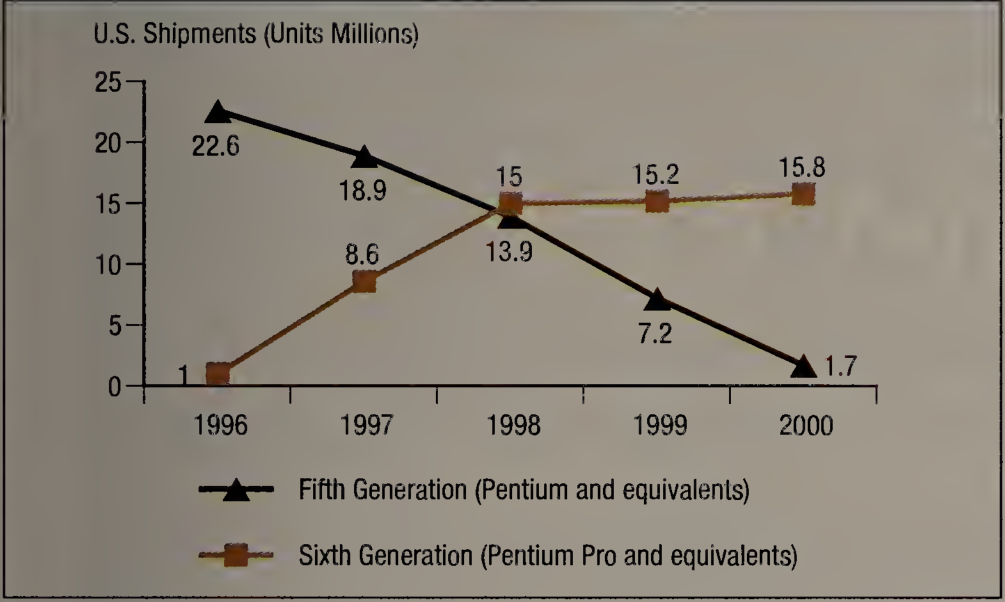
# to Next Generation PCs

**Figure 1 – Pentium vs. Pentium Pro Processor Ships**



4.0. Within two years, three-quarters of all internal PC application development will be 32-bit.

Again, IDC user research bears out corporate America's preference of Windows NT over Windows 95 or any other OS. Corporate users surveyed included in their 12-month plans a 150% increase in the use of Windows NT. They saw a decrease of Windows 3.X or Windows for Workgroups use by about 50% and an increase of Windows 95 by only 50%. Users cited reliability, security, performance, and robustness, in that order, as the most important reasons for choosing Windows NT over Windows 95. The primary departments driving advanced desktop computer system purchases among IDC respondents are MIS/DP, engineering, and R&D-traditional leading technologists, as might be expected. Somewhat surprising, are the current applications users identified running under NT such as general office automation packages (word processing, e-mail, spreadsheets) or today's general mainstream desktop applications (see Figure 2).

Among corporations polled, the Pentium Pro was also the preferred platform to run NT. Fifty percent of respondents stated that at least half of all their new PC purchases will be Pentium Pro systems by the end of 1997.

## The Call to Action

The decision of when and how to upgrade an IT infrastructure is difficult and complex. Hesitating can be even more hazardous, possibly leading to forfeited opportunity costs and lost productivity. As we approach 1997, it is clear that the U.S. corporate migration process to NT/Pentium Pro PCs is far beyond initial assessments.

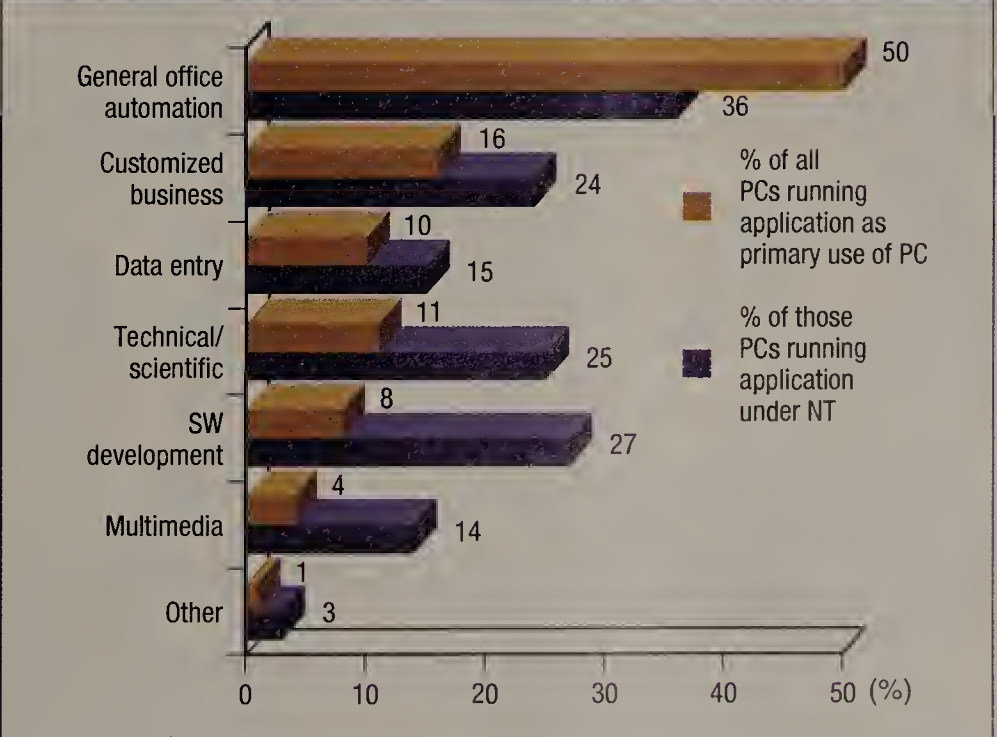
Perhaps the only thing as important as choosing the right advanced PC is choosing the right vendor partner behind it. The top criterion among the survey respondents were price/value and technical support. IDC recommends users to look for PC vendors that push the price performance ratios and offer the most complete total value package. Closely examine what prospective vendors include in:

- Hardware (components, configurations, investment protection);
- Cost of ownership (virus protection, data and system management, real time diagnostics);
- Productivity enhancement (Internet/intranet, utilities);
- Vendor viability;
- Product quality and price/performance.

IDC predicts that 1998 will be the pivotal cross-over year when Pentium Pro outstrips Pentium U.S. sales overall, and NT surpasses Windows 95 on desktops within large corporations.

Given its total value, performance benefits, and headroom, the time for serious consideration of NT is here. The collective experience and insights of 1,500 corporate users—senior IT managers already in upward PC migration, can greatly benefit an organization's information technology design and planning.

**Figure 2 – Current PC Applications, Share for NT PCs**



n = 500 U.S. Corporations

This Insight was written independently by IDC and sponsored by AST Computer. For a complimentary copy of IDC's full White Paper on migrating to Next Generation PCs (Asian, European or U.S. versions available), please call AST at 1-800-447-0023 x 100 or check the AST Web site at http://www.ast.com

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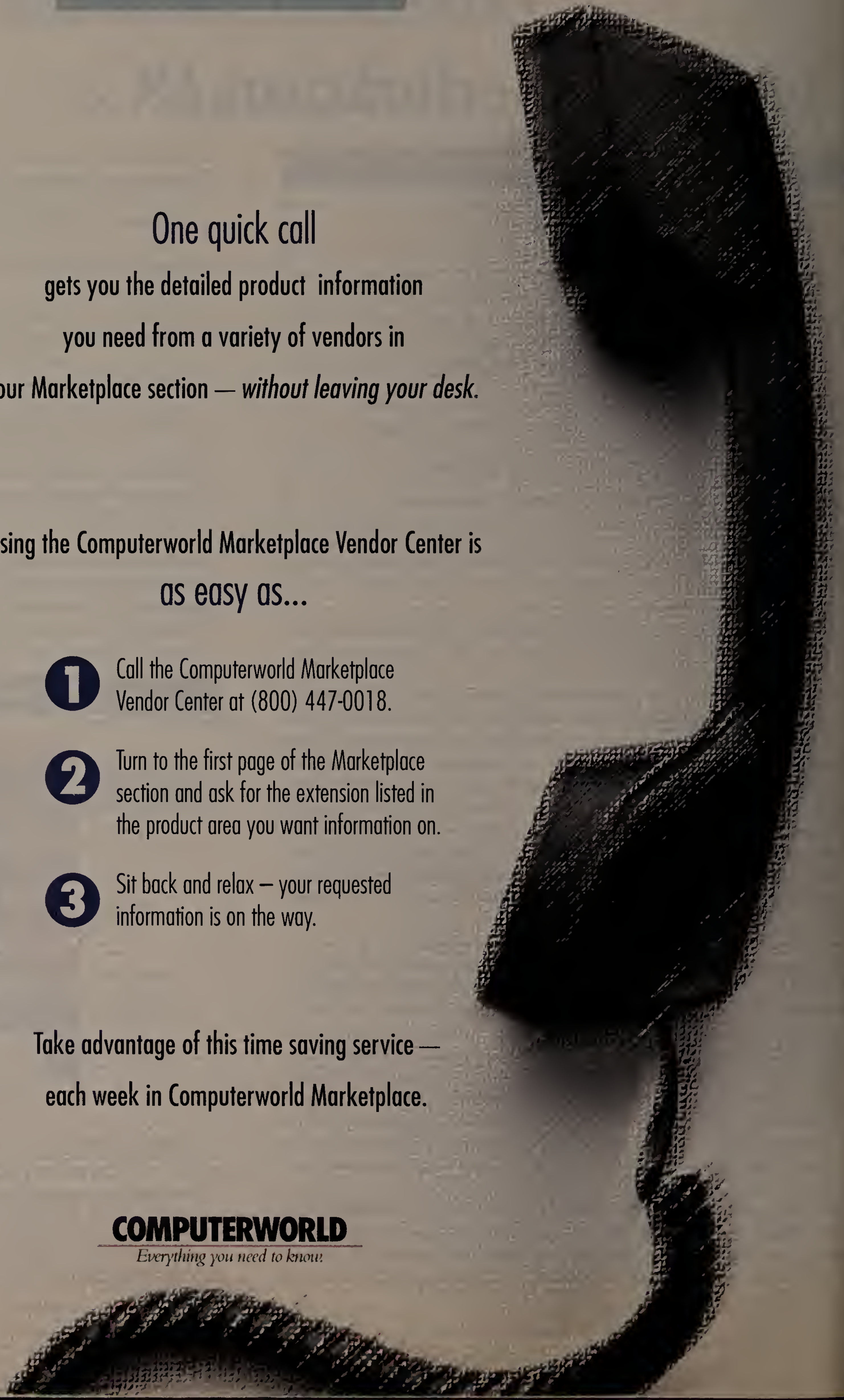

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White Paper

TBI
TECHNOLOGY & BUSINESS INTEGRATORS

# Data Marts

## How They Fit into Today's Organization

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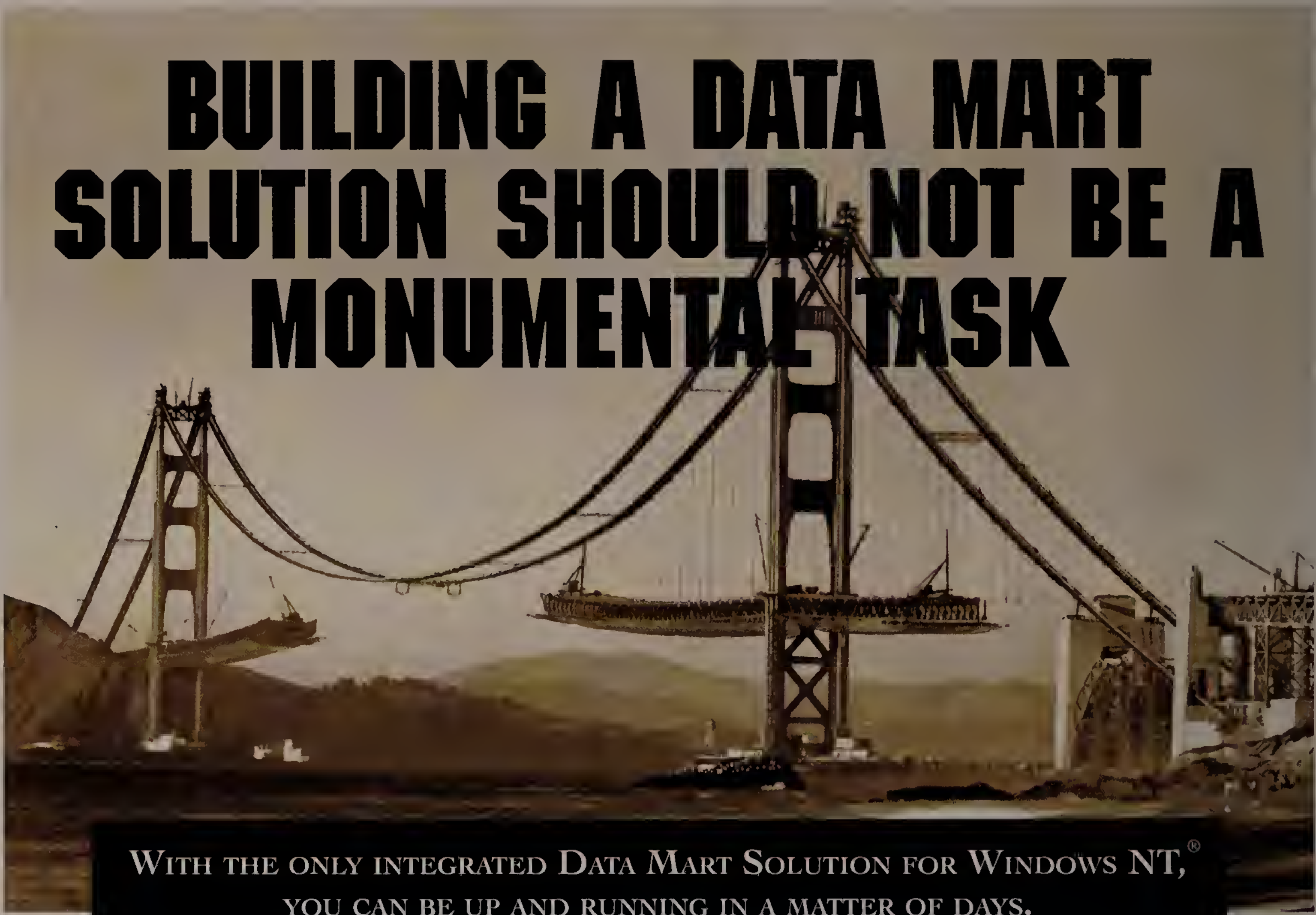
# BUILDING A DATA MART SOLUTION SHOULD NOT BE A MONUMENTAL TASK



WITH THE ONLY INTEGRATED DATA MART SOLUTION FOR WINDOWS NT,®
YOU CAN BE UP AND RUNNING IN A MATTER OF DAYS.

Now the road to instant information, rapid data mart development and deployment, and easier-to-use end-user tools is here. Introducing the Sagent™ Data Mart Solution, the high-performance solution that gives you information access at speeds quick enough to satisfy your organization's most demanding users.

Sagent delivers the first 32-bit, multi-tiered, multi-threaded architecture designed specifically for Windows 95 and Windows NT client/server systems. It's designed to run tasks in parallel and cache frequently requested data, speeding up response times even more.

Thanks to a complete set of tools, the process of populating your data mart is easily automated, whether you are moving data from an OLTP system or corporate data warehouse. In addition, end users can easily build powerful information requests by dragging and dropping business terms and icons on the desktop. And Sagent provides workgroup collaboration so end users can actively share information with each other.

To demonstrate Sagent's powerful Data Mart technology, we invite you to accept the Sagent Challenge:

**SAGENT WILL BUILD A FULLY FUNCTIONAL DATA MART PROTOTYPE AT YOUR SITE, AND DELIVER YOUR DATA TO YOUR USERS IN TWO DAYS.**

Call us at 1-800-897-5160, extension 1010, to find out how your company can qualify for the Sagent Challenge, or for more information on the Sagent Data Mart Solution. See just how fast you can get business critical data into the hands of those who need it.

SAGENT™
YOUR DATA MART SOLUTION FOR WINDOWS NT®

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# Down the Enterprise Rabbit Hole

This White Paper was written by Jerry Mirelli, Executive Vice President of Technology & Business Integrators (TBI), an IT management consulting firm.

At TBI, Mr. Mirelli oversees business development and strategic alliances. His background includes 11 years with IBM in a consultative sales capacity. He also managed IS department activities for CARE, an international development agency, and served as director of IS for the Metropolitan Museum of Art in New York City. Having experienced the perspectives of both vendor and IS management, he possesses a broad understanding of the impact of technology solutions on organizational performance.

Headquartered in Woodcliff Lake, N.J., TBI is a leader in the outsourcing arena. Its clients include Fortune 100 companies in industries such as aerospace, utilities, finance, insurance, retailing, automotive manufacturing and health care.

> "What do you mean by that?" asked the Caterpillar sternly. "I'm afraid I can't put it more clearly," Alice replied. "Being so many different sizes . . . is very confusing."
>
> "Then you should say what you mean," the March Hare went on. "I do," Alice hastily replied. "At least . . . at least I mean what I say . . . "
>
> Then the Queen said, "Have you seen the Mock Turtle yet?" "No," said Alice. "I don't even know what a Mock Turtle is."
>
> ALICE IN WONDERLAND BY LEWIS CARROLL

Many of us are confused by the concept of a data mart. Just when we had finally grasped the idea of what a data warehouse was, another notion was foisted upon us. Just what is a data mart? How does it differ from a data warehouse? We vaguely feel that size is an important part of the distinction between the two but, like Alice, we're not sure what that means. Is data mart just a term for a small data warehouse? Or is the difference between the two more fundamental? Should a data mart be used in place of a data warehouse? Or in conjunction with one?

Data marts are still an evolving concept. This White Paper will examine the directions that data marts are evolving in.

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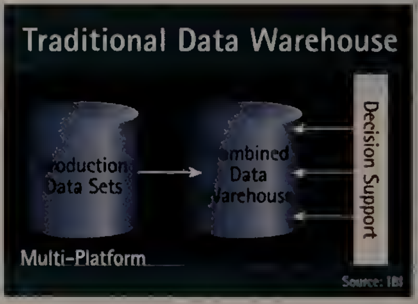
# Data Marts: Where They Fit in Your Organization

It was mid-1995. Data warehousing had just come into its own. But since then, we've rethought our approach to this new class of decision support tools. And what caused us to rethink this so quickly? One word — workgroups!

As soon as companies completed their migration to a fully networked environment, they were confronted with a new challenge. Once the employees realized they were able to connect to all of an organization's disparate databases, they tried to do just that — in droves.

But their initial enthusiasm quickly turned to frustration, as they encountered a bewildering variety of techniques. Each platform carried its own set of retrieval and reporting procedures, and the data extracted from these various sources had to be combined on desktop PCs. IT found itself overwhelmed with endless requests for help and complaints about data inaccuracies.

It was at this point that data warehouses — collections of data extraction and analysis tools — appeared. They provided four major benefits to this new distributed infrastructure: 1) reduced processing loads on operational systems; 2) improved integrity and validity of the data; 3) increased data access performance; and 4) a single query and reporting mechanism.



Traditional Data Warehouse

Source: IBI

But the scope and cost of data warehouse efforts were frequently onerous. An IT department must approach any initiative with an enterprisewide perspective, considering any new capability in terms of all the users and design approaches. This usually results in large, high-priced projects with protracted delivery schedules . . . just what all the newly formed workgroups didn't want!

**Workgroups in the newly flattened organizations balked at the continued reliance that complex data warehouse environments had forced upon them.**

FAST PAYBACK

In reshaping themselves into flatter forms, organizations delegated real decision-making authority to the workgroups and teams. Charged with producing bottom-line results, these groups demanded quick results and fast paybacks. They could not afford to wait for data to be made available in the warehouse, and balked at the continued reliance on IT that complex warehouse environments had forced upon them.

At the same time these workgroups started to feel frustrated by their inability to easily get to their own data, they were being dazzled by a new and highly intuitive information retrieval mechanism — the Internet.

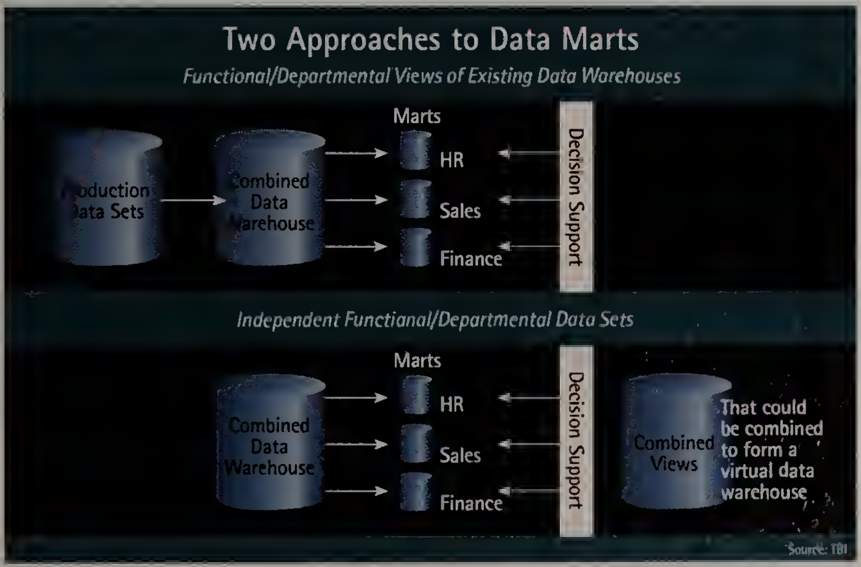
Why was it, they wondered, that they could independently access information on a global basis but not on a corporate one? Their appetite for similar internal capabilities was whetted by exposure to an open data interface that was easy to use and self-directed.

During this period, data warehousing vendors were recognizing the need to provide tools that were more tightly integrated, had full GUI invocation and were priced more attractively. When they heard the complaints from the workgroup community, they sensed an opportunity and jumped in. The data mart was born.

**Workgroups were being dazzled by a new and highly intuitive information retrieval mechanism — the Internet.**

However, each vendor had its own idea of what a data mart should be. These definitions varied enormously; some were technical, others functional. The characteristics of data marts (which no one vendor includes) are:

- Small, in terms of users and/or database size
- Application-specific


Two Approaches to Data Marts

Functional/Departmental Views of Existing Data Warehouses
Marts
Production Data Sets
Combined Data Warehouse
HR
Sales
Finance
Decision Support
Independent Functional/Departmental Data Sets
Marts
Combined Data Warehouse
HR
Sales
Finance
Decision Support
Combined Views
That could be combined to form a virtual data warehouse

Source: TBI

> **"Delivering data via a mart will demonstrate the value of data warehouses to our internal customers and encourage them to support this direction."**
>
> *— Jonathan Wiltshire, San Diego Gas & Electric*

- Department- or workgroup-oriented
- Defined, designed and developed by a business unit
- Administered and maintained by the business unit
- Fast implementation
- Less expensive to purchase
- Quick ROI

- Tight integration of tool sets
- Point-&-shoot functionality
- Summarized subsets of more detailed, pre-existing data warehouse
- Low-cost package of consulting services, hardware, software, applications
- Overall ease of use

## No more islands of local databases

When San Diego Gas and Electric began to investigate data marts, it recognized the importance of developing a global data view of the company but wanted to adopt an approach that would not be intrusive on its users or its IT development group.

"We have to provide our users with a means to access their data without compromising the organization's need for data integrity," says Jonathan Wiltshire, data administrator for SDG&E. "Data marts are the fastest way to accomplish these seemingly disparate goals."

The reason for this, says Wiltshire, is that smaller, incremental projects usually work better in IT, and the utility "can implement a greater number of smaller, data mart projects in rapid time frames — six months as opposed to years for a typical corporatewide data model."

After evaluating offerings from Carleton, Informatica, Prism and Platinum, SDG&E selected Informatica. According to Wiltshire, the decision was based on the vendor's tailored data mart approach, as well as the product's price, its use of a server scheduler that did not rely on the need for Cobol extract programs, and its inclusion of a repository function with a modeling ability that is accessible from a GUI.

Wiltshire sees SDG&E's direction with data marts as a series of tactical successes that build toward a future enterprise model while meeting user needs today. He calls it a bottom-up approach to data warehousing. "IT management believes that delivering data via a mart will demonstrate the value of data warehouses to our internal customers and encourage them to support this direction," he says.

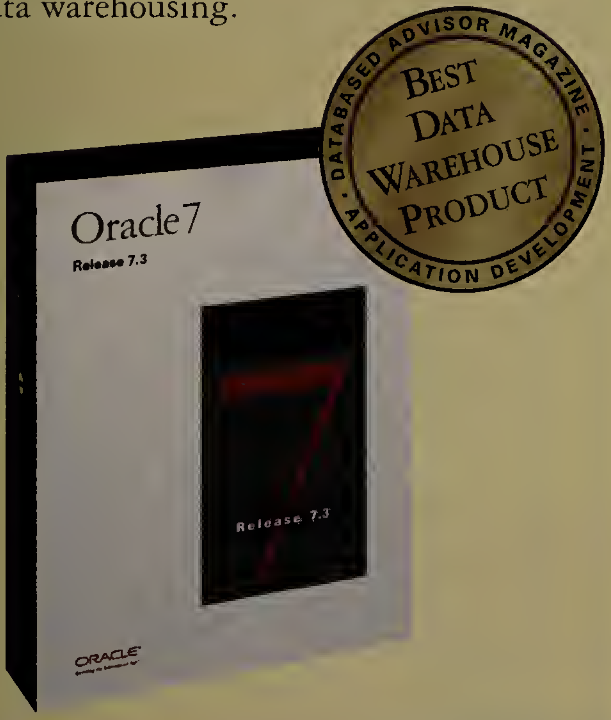
Wiltshire views data marts, and the data warehouses that will eventually derive from them, as a way to counter the islands of local databases that have sprung up in various departments. "These databases are often created with separately developed file transfer programs that often produce conflicting data," he says, noting that they often cannot talk to each other.

According to Wiltshire, an advantage of a data mart is that it allows you to capture metadata along the way, providing a place for data administration and data management requirements in the process.

# Oracle7
# #1 For Data Warehousing

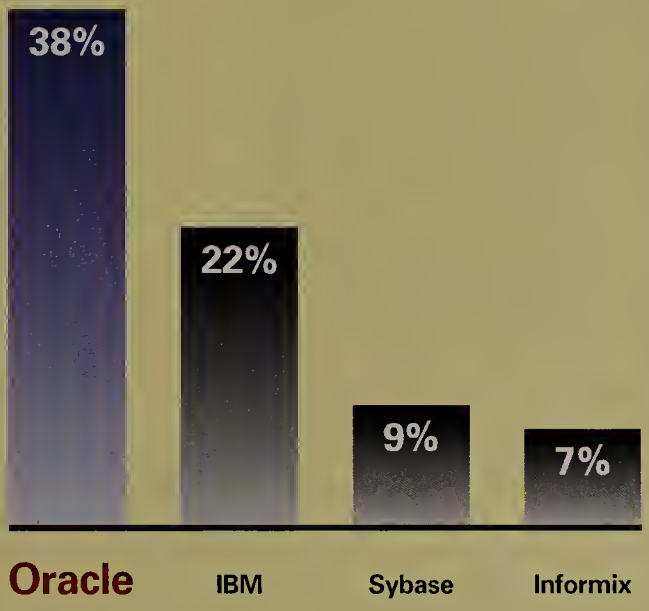
## #1 Readers' Choice

*Databased Advisor* names Oracle7 #1 for data warehousing.



## #1 Customer Choice

IDC names Oracle #1 in the worldwide data warehousing market.



**Top Four Vendors**

Oracle7 has more features for data warehousing than any other RDBMS: parallel query, index and load; bit-mapped indexes; star queries; OLAP integration; and scalability across a range of SMP and MPP systems. It's no wonder that more organizations rely on Oracle, from their largest data warehouses to their smallest data marts. And, it's why more application developers build their data warehouse solutions on Oracle7. So, if fast, accurate decisions are important to your company's performance, call Oracle at 1-800-633-1071, ext. 10345, or find us on the Web at http://www.oracle.com

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**Data warehouses "provide expensive piles of untargeted data that fail to address many end users' needs."**

*– Forrester Research*

- Does not require highly skilled personnel specifically trained on the product
- Scalable to a full data warehouse
- Heterogeneous, full platform support
- Availability of off-the-shelf applications

Even though each vendor had their own idea of what a data mart was, the market research firms held more consistent opinions. Aberdeen Group in Boston called data marts "a kind of best practice of data warehousing." Forrester Research, across the Charles River in Cambridge, Mass., said that data warehouses "provide expensive piles of untargeted data that fail to address many end users' needs."

**Each data warehouse vendor has a single, much improved product set that is priced more attractively.**

At this point, it would be reasonable for you, the reader, to think that a vendor would have separate toolsets for its data mart customers and data warehouse customers. Or that one toolset would have fewer features, with an additional purchase needed for the more robust version. Or that there was a clear demarcation between the products that to determine which was required.

**Meta Group reports that 25% of all sales of Microsoft Windows NT are for data marts.**

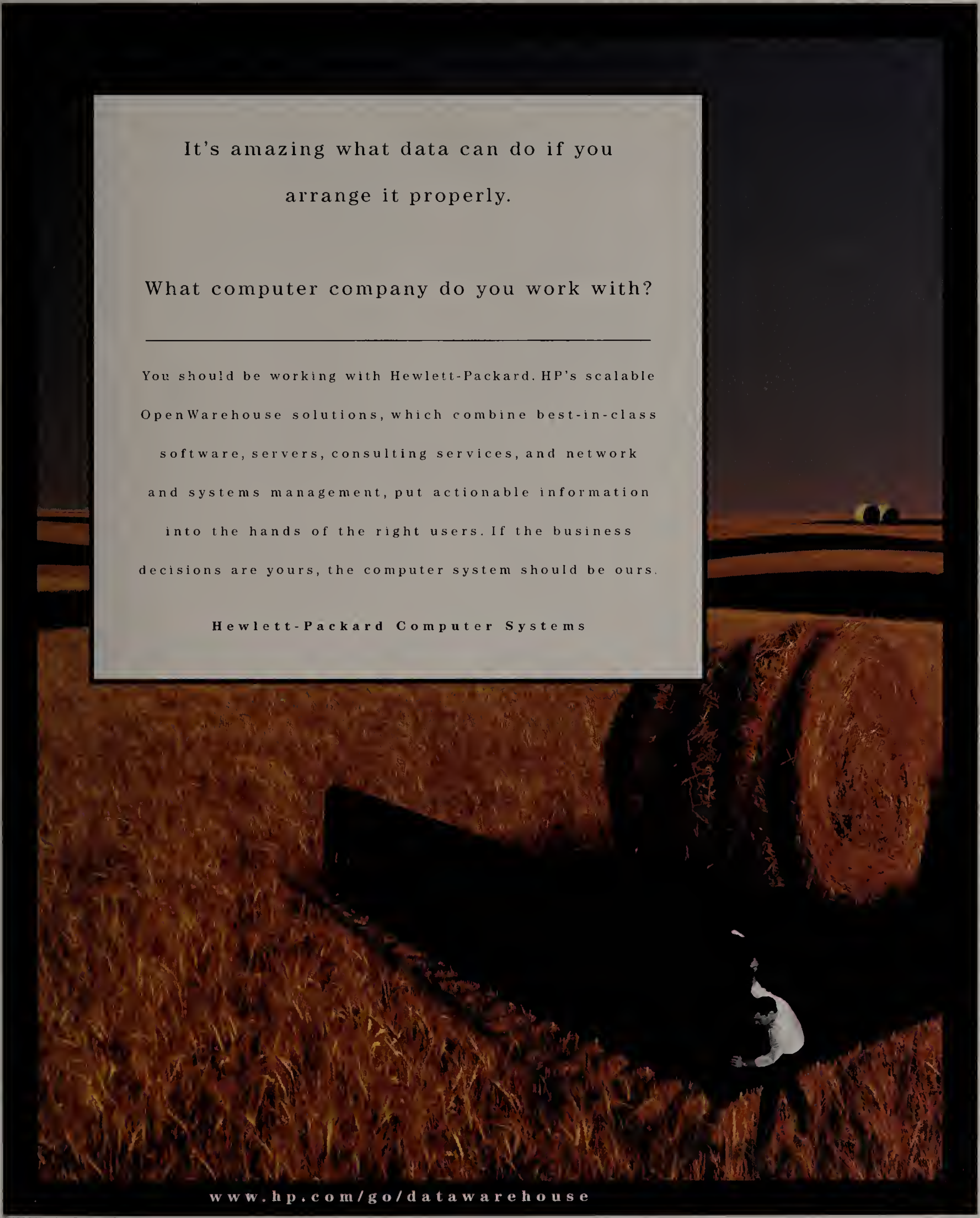
However, the truth is, there are no differences except for one: cost. The only change vendors made was to reposition their existing products in a manner that acknowledged the realities of the emerging data mart market.

POSITIVE APPROACH

Don't misunderstand — this approach by the vendors is a positive one for potential users of data warehouses, since it opens the door to more experimentation by a vastly broader community. The point is that each vendor has a single, much improved product set that is priced more attractively. Many products are now offered on a per-seat basis, the same way productivity tools are. These tools work together in a common way off a single set of coordination, or metadata . . . at least within each vendor's offering.

Vendors are also supporting less expensive platforms, specifically Microsoft Windows NT-based servers. Meta Group, a research firm in Stamford, Conn., reports that 25% of all NT sales are for data marts.

Data mart vendors are also taking their cues from companies that supply desktop software by providing wizard-type assistance along with other intuitive, non-procedural provisions that support the vendors' claims that fewer technical skills are required to use the product. They are also coming to terms with the Internet and whether this explosive interface will help or hinder them.



It's amazing what data can do if you arrange it properly.

What computer company do you work with?

---

You should be working with Hewlett-Packard. HP's scalable OpenWarehouse solutions, which combine best-in-class software, servers, consulting services, and network and systems management, put actionable information into the hands of the right users. If the business decisions are yours, the computer system should be ours.

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## Feature Sets of Five Data Mart Vendors

| FEATURE | INFORMATICA | IBM | PLATINUM | SAS INSTITUTE | SAGENT |
|---|---|---|---|---|---|
| Standardized GUI for all components | Yes | Yes<br>Windows NT | Yes<br>OLAP tool also has browser/Java-like front end which will be ported to rest of product suite by 1997 | User-friendly interfaces can be customized to specific needs throughout product set | Tools built for 32-bit Windows NT/95 platforms |
| All components fully integrated | Yes | Yes | 70% — full integration due by mid-1997 | Yes | Yes |
| Single metadata repository that drives all components | Yes | Yes<br>including full automation | No | Yes | Yes<br>including end-user modifications |
| Source file support | Most | Most | Most | All | Native interface to SQL Server, Oracle and Sybase |
| Destination file support | Most | DB2 | Most | All (including proprietary SAS) | ODBC interface for Red Brick and DB2 |
| Scrubbing/ Summarizing | Single-pass cross-tab output | Minimizes data transfer by acting directly on operational data | Fully executable | Internal data model allows fast amendments after build | Summarization and indexing can be developed after the data mart is created |
| Query/Reporting features | Report engine is integrated with business objects | Supports ODBC | Internet support for OLAP | Can link multiple reporting systems into a customized EIS | Ad hoc queries do not require knowledge of underlying DBMS structures |
| OLAP features | Star schema design wizard | Supports Arbor Essbase, Business Objects and Cognos | Fully relational toolset | Full-function SAS programming language | Data flow provided behind analysis |
| Fully open architecture (NT ability/restrictions) | Supports native NT features such as MAPI | Specifically developed for the NT environment and supports many native NT features | Selected by Microsoft for its data warehouse strategy. Runs on MVS, Unix, AIX, NT, OS/2 | Client support for NT | Native NT threading for optimal performance. Supports NT server security model and scheduling service |
| Ease of use/ Intuitiveness | Full drag-and-drop transformation and design — no code requirements. Browser-like interface | Interactive data model definition and modification | Microsoft and browser interfaces throughout tool set. End-user focus a priority | Common look-and-feel menus provided throughout product | Complete end-user drag-and-drop interface and English-like sentences for queries |
| Total non-procedural functionality | Procedural code not required. On-the-fly transformation engine allows user-defined stored procedures | All operations are metadata-driven using a point-and-click approach | Built-in job scheduling | 4GL and ready-to-use procedures | Visual/Iconic interface for power users to build data flows and populate data marts |
| Toolset completeness | Full support for entire data mart development life cycle | Full support for entire data mart development life cycle including host adapters | Full support for entire data mart development life cycle | Full support for entire data mart development life cycle | No report/presentation component at this time |
| Platform requirements | Client- Win95 or NT<br>Server- Unix or NT<br>Repository- either Oracle, Sybase, Informix or SQL Server | OS/2 or NT | MVS, Unix, AS/400, AIX, OS/2 under DB2, Oracle, Sybase and Informix | MVS, VM, VSE, VAX, Unix, OS/2, Macintosh, Windows 3.0/NT/95 | Client-Win NT/95<br>Server-Win NT |
| Pricing<br>One time per server per seat etc. | Server- $45K/NT or $65K/Unix. Includes 1 source and 1 target DB. Add'l source $20K-$30K. | Full product set including DB2, Lotus Approach etc. - $23K for unlimited access (no per seat charge) for VisionWare, 5 DB2 licenses and 1 Approach license. Add'l DB2 licenses at $75 each maximum with similar pricing for other components. IMS or VSAM Adapters priced at $9500. | Call for specifics | Per CPU pricing for servers and mainframes, per processor or total user pricing for PCs and workstations. Call for specifics | One time per server and per seat pricing. $50K bundle includes 1 server, 1 admin, 1 design and 20 seats. |

**NOTE: All information as provided by vendors, comments represent highlights of larger narratives. Contact the vendor for full details.**

Some companies promote
data warehouses.
Others just want to sell
data marts.

**We prefer to look at both ends of the enterprise, and everything in between.**

## Prism Solutions. Bringing business information to more people, in more places, throughout your company.

Information experts at large corporations know how difficult it can be to compile meaningful business information. Corporate data is commonly stored in a complex, yet disparate, heterogeneous web of applications and operational databases. Finding these "islands of data" is quite a task all by itself. Integrating them into a comprehensible source of information can take forever.

Thanks to Prism's information architecture—an architecture which not only includes enterprise data warehouses, but departmental or "distributed" warehouses and data marts as well— you can provide users throughout the enterprise quick and easy access to useful, comprehensive business information.

Maybe you're wondering what the difference is between a distributed warehouse, a data mart and an enterprise data warehouse? While the type of information within these different "sizes" of the data warehouse can vary in volume and content, the real difference is probably best defined by the levels of the organization and the problems they are trying to solve. Enterprise warehouses typically serve corporate managers dealing with strategic business issues. Distributed warehouses are often the choice of regional headquarters or branch offices. And data marts are generally implemented in departments where only a specific subset of functional historical information is needed.

## Taking a top-down/ bottom-up approach to data warehousing

Because data is often hidden within legacy systems, locating and deciphering usable information can often take months, sometimes even years. Most businesses can't wait that long. Prism solves this problem by extracting the data, transforming and storing it in a single, integrated, homogenous format within a data warehouse. And this process typically takes 60-90 days with Prism, for initial warehouse development.

*Yet it is Prism's architecture that truly distinguishes it from other data warehouse vendors.* Whether you're processing information from your source database into a centralized data warehouse, a distributed warehouse or a series of data marts, you only need to collect and process it once. The information can then be transported freely between any point of use within the information architecture. Specific data can easily be customized to meet the needs of the department or group that will be using it.

The Prism architecture also actively collects, manages and makes extensive use of meta data. Meta data is your card catalog to the data warehouse. It can tell you where to find specific information, how that information is defined, where it originated from, and the related business assumptions

With Prism data warehouse technology supporting your organization, you'll have all the information you need with an historical perspective right at your fingertips. You'll be able to evaluate current business efforts as well as spot emerging trends which could provide new opportunities In short, the people who make the decisions which affect the future of your business will have all the facts and figures they need

## The Value Proposition: Insuring Successful Implementation

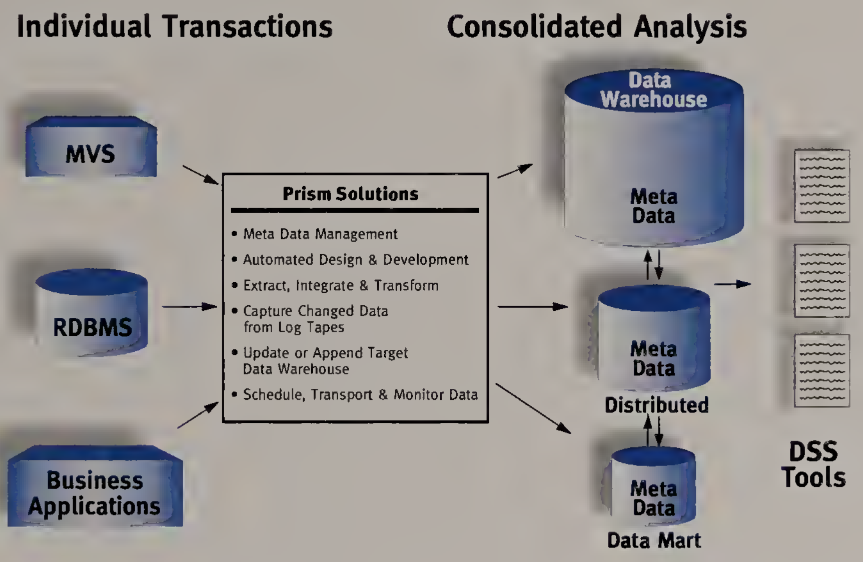
No one knows better than Prism that a data warehouse isn't something that comes in a box. That's why we provide the entire framework—software, iterative methodology, training and consulting—to effectively implement and maintain a data warehouse architecture. We take you from the start, step by step, all the way to completion, helping you develop special skills and knowledge as the process unfolds.

We've spent the last five years refining our data warehouse methodology. Now we have a tested formula that's been proven in the field. We understand the process, and more important, we understand what customers need to integrate data into their information infrastructure.

***Prism Warehouse Manager***™ is the software that transforms operational data into usable business information. It generates programs to extract operational data and external data from source databases, integrates the data from the various sources, and then transforms and loads the integrated data to a choice of target databases on mainframe and client/server platforms. An extensive selection of built-in transformations allows users to perform the data conversions, summarizations, key changes, structural changes and condensations needed to create an historical perspective of information.

***Prism Directory Manager***™ allows users to build, store and navigate an integrated Information Directory of the meta data in a data warehouse. Similar to the card catalog at a library, Prism Directory Manager assists users in finding relevant information for analysis by providing integrated views of business and technical data in the warehouse. It shows where it came from, how it was transformed and how it has changed over time. Users can create their own customized views of the meta data to fit their business requirements. Prism Directory Manager is comprised of three components: the actual Information Directory, Directory Builder and Directory Navigator. Directory Builder customizes views, imports and exports meta data and sets up relationships. Directory Navigator navigates the meta data and launches queries into the warehouse.

***Prism Change Manager***™ automates data warehouse maintenance by capturing, transforming and applying changed data to the data warehouse. Using log tapes as a source, Prism Change Manager captures only relevant changed records via off-line and unattended execution, saving production time and money as well as protecting the performance of operational systems. Current or near-current changed data is captured from fields that were used as source files for the data warehouse, including DB2, Enscribe, IMS, NonStop SQL, and Oracle. As data warehouse architectures grow and mature, Prism Change Manager becomes increasingly more valuable. User requirements change. Warehouse performance is constantly being tuned. And information is constantly being updated.


**Individual Transactions**

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• Schedule, Transport & Monitor Data
Data Warehouse
Meta Data
Meta Data
Distributed
Meta Data
Data Mart
DSS Tools

***Prism's Iterations***™ ***methodology*** provides a detailed process roadmap for developing data warehouses in concise, iterative steps. This methodology is designed to adapt to data warehousing projects of any scope, from the enterprise level to the data mart. It establishes an effective development process that defines the ongoing parallel steps and iterative cycles needed to deliver architected data warehouse solutions in reasonable time frames.

***Prism's SureStart***™ ***consulting programs*** help customers achieve early, visible results. These programs, which include SureStart Readiness Assessment, the SureStart Mentored Pilot Program, the SureStart Mart and the SureStart Data Modeling Program, help customers get their data warehouse plans started quickly.

Prism's consulting services are designed to assist customers through every phase of data warehouse implementation, to help them shorten project lead times and to minimize project risk. Prism consultants are some of the most highly experienced and well-trained professionals in the data warehouse industry. With Prism consulting services, customers can confidently tackle any planning, analysis, design and implementation challenges that might arise during data warehouse implementation.

At Prism, we are constantly looking for better ways to help existing customers get more from their information. As our customers' warehouses grow, we are focused on enhancing our products in the area of automated design, data distribution and delivery systems.

PRISM

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THE REAL DIFFERENCE

Once the hype fades away, we can more objectively sort through the claims for the differences between data warehouses and data marts. These claims can be divided into cultural differences and developmental differences (see p. 12).

Cultural differences come into play because the true driver behind the growth of data marts is the need to empower end users. This empowerment includes the ability for users to control access to their own data as well as to create their own solutions independent of another group. IT, unable to keep up with the landslide of requests for data analysis, would love to see users take on some of this responsibility.

These cultural changes are the result of a reassessment of data warehouses, in terms of degree of difficulty, cost, complexity and likelihood of success. In short, we are being asked to discard our beliefs in the "galactic" nature of a data warehouse.

Developmental differences are more the result of a maturing product class, and how the ensuing improvements are promoted, than of any true difference in warehouse and data mart feature sets. The latest generation of data warehouses provide a greater degree of

## More than just a tool for workgroups

Data marts appeal to more than departmental workgroups. Automatic Data Processing (ADP) views them as logical extensions to the payroll and Human Resources processing services they provide to their own departmentally-based clients.

ADP provides a third-party report writer, ReportSmith, with its service. Last year, the firm decided to offer its customers a data mart that would allow them to access and report on their data more effectively. The departmental nature of data marts seemed to fit their client profile snugly.

Customer satisfaction with the report writer was a part of ADP's choosing Sagent Technology as its data mart vendor. Since San Francisco-based Sagent had been founded by the developers of ReportSmith, ADP felt that its customers would easily adopt Sagent's similar design philosophies.

"Sagent delivered a technically superior package of solutions that included scheduled downloads and report configurations in a high-performance package for our clients," said Sam Stockdale, vice president of development for ADP. "Their product presents a consistent interface to both end users and developers that is powerful and intuitive. Since the product doesn't require a steep learning curve, our clients can come back to the product after six months and still be productive."

According to Stockdale, one feature that distinguishes the Sagent data mart is its ability to take a "snapshot" of the dataset that produced a particular report so that future refinements of that report will work from the same non-updated data.

The product also includes the ability to "transform" a common query language to other industry standards such as SQL, C++ or VisualBasic in order to take advantage of the strengths of each approach.

## Cultural Differences

| | WAREHOUSE | MART |
|---|---|---|
| **Owner** | IT | Workgroup |
| **Focus** | General Capacity | Business Solution |
| **Implementation** | Top Down | Bottom Up |
| **Scale** | Enterprise | Departmental |
| **Pricing** | Up Front | Incremental |
| **Time Frames** | Protracted | Shortened |
| **Scope** | Ambitious | Modest |
| **Administration** | Centralized | Distributed |
| **Adaptation** | Revolutionary | Evolutionary |
| **Data Perspective** | Detailed | Summarized |

desktop-style “usability” than their predecessors, which grew out of the mainframe world.

An evaluation team should analyze both sets of differences — cultural and developmental — before selecting a product. Not all products are equally along the development curve. The challenge for anyone who is going to purchase a data mart and implement it is to determine which combination most closely matches their organization’s objectives.

**For a data mart to succeed, the IT department must be committed to a team-oriented structure that reflects its role as internal consultant.**

## Developmental Differences

| | WAREHOUSE | MART |
|---|---|---|
| **GUI Interface** | None | Mostly "point & click" |
| **Tool Set** | Fragmented | Tightly integrated |
| **Approach** | Procedural | Non-procedural |
| **Skill Requirement** | High | Power user |
| **Total Cost** | High | Contained |
| **Strategy** | IT | Goal-specific |
| **Design** | Proprietary | Open |
| **Platforms** | Selective | All |
| **Architecture** | Mainframe | Server |
| **Feature Set** | Reduced | Rich |
| **Functionality** | Limited | Full |
| **Query/Reporting** | Arduous | Intuitive |
| **Applications** | None | Preconfigured |
| **Performance** | Slow | Native/Compiled |
| **Versatility** | Restrictive | Flexible |
| **Learning Curve** | Prolonged | Condensed |

### WHAT TO CONSIDER

Improved ease of use may be the fundamental characteristic of a data mart. The real promise of data marts lies in the opportunity they offer to quickly distribute meaningful end-user analysis across the enterprise.

Before implementing a data mart, a company should be aware of the relationship between its IT and user groups. For a data mart to succeed, the IT department must be committed to a team-oriented structure that reflects its role as internal consultant. IT should be ready to train and coach the user community on their data structures and how this data can contribute to the management of their business. This often requires a plan for user involvement that provides them with improved analysis capability incrementally.

Users should embrace the chance for greater technical self-sufficiency. They should welcome the opportunity that data marts offer to become more directly involved in data manipulation activities. This involvement should go beyond simple queries to a database. Over time, they should commit to developing a broader and deeper analytical capacity. Ultimately, the greater intuitiveness of product interfaces will move users closer to the holy grail of data access: administering their own data configurations without relying on unique technical skills.

Any product selected should maximize a data mart's potential for amplifying the impact of direct data access by providing the greatest degree of effortlessness. Such products will be simultaneously accepted by many user groups in a bottom-up march towards a unified corporate knowledge store.

One prerequisite of a data mart is a point-and-click GUI that allows the user to execute all features sets and is consistent across the product. Nothing frustrates non-technical people more than having to

> **"We needed a product that wouldn't overwhelm us with complexity, but would still make previously locked-up data easily available."**
>
> *– MaryAnne Barry,*
> *Controller's Office,*
> *State of New York*

# One interface for data transformation

In late 1995, the IT group at the Controller's Office for the State of New York was searching for ways to download mainframe data to a client/server decision support prototype that was being developed for an HP server with PowerBuilder.

After evaluating IBM Visual Warehouse, the group realized that "it could be used for a broad variety of departmental data transformation requests that were growing in volume," said MaryAnne Barry, data processing manager for the Controller's Office. These requests had been handled by custom programs that converted VSAM files to flat files and spreadsheet formats. Employing a data mart not only reduced the overall delivery time, it also provided a single interface for data transformation.

According to Barry, the key benefit of Visual Warehouse is the ease with which decision support can be moved to the user. This includes opening up administration access and business view definition to the user. The product also offers data handling versatility in mapping data from multiple mainframe sources into a single table.

"Visual Warehouse gives us an inexpensive means to provide decision support solutions for our customers," says Barry. "We chose it because we needed a product that wouldn't overwhelm us with complexity, but would still offer all the functions necessary to make previously 'locked up' data easily available to our customers."

Barry has used the toolset to provide a variety of users with direct access to their data. But to reach her goal of full user empowerment, she says that Visual Warehouse's metadata and transformational abilities will need to be improved.

Barry envisions internal customers becoming acclimated to their data in three stages. In stage one, ad hoc queries will expose them to their data. In stage two, On Line Analytic Processing (OLAP) capability will provide increased decision support directly to the users. In stage three, the management teams will take advantage of the predictive power of trend analysis to get a jump on developing situations.

# Data Mart Face-off Generates Rave Reviews

TBI
TECHNOLOGY & BUSINESS INTEGRATORS

On October 15, a regional "Data Mart Face-off" was held in New York City. This event was hosted by TBI/Research, the research division of Technology & Business Integrators, Inc., and Computerworld. The purpose of the event was to provide members of the IT community with information on data marts by having vendors present solutions to hypothetical "needs statements" with escalating difficulty levels in three industries: insurance, health care and banking.

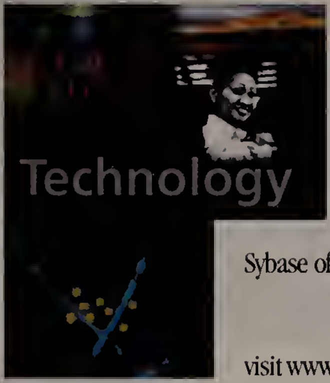
Due to time constraints, only four vendors — Informatica, IBM, Platinum Technology and SAS Institute — were allowed to participate. Each of these four vendors supplied their own core data repository building tool and offered the full complement of life cycle data warehouse development tools.

Each vendor had 20 minutes to present an end-to-end solution to the problems presented. They had to describe the business case, their approach and how it differentiated them, and what the total implementation cost was, including hardware, software and consulting charges. They were allowed to bring in other vendors' products to provide functionality that their tool set did not currently offer.

Overall, the proceedings, which were capped by a Q&A with the vendors, resulted in an in-depth look at the data warehouse toolsets of each vendor. The Face-off allowed attendees to compare techniques and pricing on an apples-to-apples basis across a broad spectrum of needs, as well as to assess the vendors' competencies in the three industries showcased.

The four vendors and the audience agreed that the format provided key information to a focused group of potential customers. A second Data Mart Face-off is tentatively scheduled for the West Coast in 1997. Interested parties should contact TBI's Jerry Mirelli at jmirelli@tbicentral.com or at (201) 573-0400.

Scott Barnes, MCI
Senior Manager of Database Marketing Systems



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navigate an uncoordinated hodgepodge of screens and approaches. What users want is to think less about how they are accomplishing their tasks and more about the tasks themselves. This requires a product set that is highly coordinated and tightly integrated, in both external presentations as well as internal design.

As these products become more desktop-centric, they will need to support a fully open environment. Users who have grown used to a particular query tool may want to use it across multiple assignments with different organizations. The need to mix and match tool

## Dual approach provides flexibility

Project scope per se does not preclude a data mart. When pharmaceutical giant Bristol-Myers Squibb decided to address the needs of all its global markets separately, it needed to find the best means of delivering the targeted information that each of its business units needed.

To help plan this initiative, BMS used two consulting firms: IMS Professional Services, an IT pharmaceutical consulting firm owned by Dun and Bradstreet, and Reltech, a data warehouse consulting firm (since acquired by Platinum Technology and now called Platinum Information Management Consulting). This team decided that BMS should provide a stable, controlled and predictable data warehouse repository as the foundation for a set of flexible, business-focused collections of data marts.

The data marts, which were to provide decision support to the individual units of three of BMS' eight divisions, had to be readily disposable, so that each unit could quickly and easily modify their requirements to address changing market drivers, without affecting the integrity of the main data warehouse. "This approach centralizes the data transformation process while enabling the use of new tools that provide point solutions to specific business needs," says Leo Dodds, project manager and IT/user liaison for BMS' global data warehouse solutions initiative.

The combined warehouse/mart approach gives BMS divisions the freedom not only to choose the tools that make the most sense for them at the time but also to easily change them. This freedom can be seen in Dodds' area, which uses Oracle SQL Script to extract data from an AS/400 production environment, custom RPG code for data transformation to an HP server, OLAP and query/reporting tools from Cognos Corp., and PowerBuilder for front-end development. Meanwhile, other BMS divisions are using other products, including InfoPump from Platinum.

This freedom is also reflected in the fact that BMS is considering global standardization of its OLAP tools. Now the combined data mart/warehouse approach will make such migrations much easier than they might have been.

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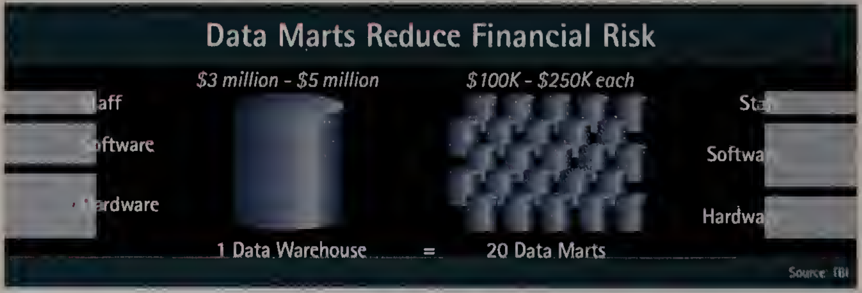
**Some view data marts as a repeat of the isolated corporate "columns" that existed in the 1980s.**

components will become mandatory. The best data marts are moving toward a fully open interface environment that will support all hardware and database platforms. Such products will accommodate the plug-and-play demands of users.

Performance will become an issue as a company moves towards a fuller corporate data model. Many functions across different platforms can be handled as either native code to the platform in question or as interpreted commands mapped to a particular platform.

**Vendors are touting — and demonstrating — a commitment to open platform support and full scalability that could circumvent concerns about data marts.**

A product's range of features is not as significant as its flexibility. The most important consideration for vendors is to offer the richest set of capabilities along with the shortest learning curve.

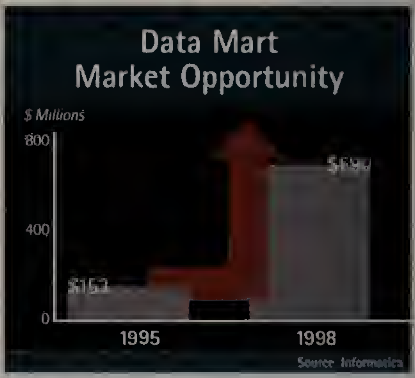


Source: IBI

## HITTING THE MARK

The growth in popularity of data marts mirrors the way PCs gained their foothold in corporations: the desire of users to control their own data (in this case, spreadsheets) without going to a centralized IT group.

The pattern for data marts is similar. Ubiquitous desktop access to a company's far-flung database over a stable network was the first step. Next, user-friendly set-up and administrative procedures began to replace the older, technically oriented interfaces that grew out of the centralized model.



Source: Informatica

Yet there are reservations about this approach to data access. Some observers view it as a repeat of the isolated corporate "columns" that existed in the 1980s. Others worry about yet another crop of incompatible systems that will only cause more headaches down the road.

Still, the benefits of rapid ROI, quick deployment and local control are hard to beat. Further enhancing the value of data marts is the fact that vendors are demonstrating a commitment to open platform support and full scalability. With only 5% of today's data warehouse projects targeted for mainframes, data marts are indeed a case of "workgroups hitting the mark." ✦

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## New Products

**Elo TouchSystems, Inc.** has announced a flat-panel touch screen, IntelliTouch Ultra, for use with Fujitsu America, Inc.'s 21-in. gas plasma color monitor.

According to the Fremont, Calif., company, the touch screen/monitor combination was designed for public uses, including information kiosks and multimedia applications.

It costs $1,200.

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---

**CyberResearch, Inc.** has announced the six-slot and 11-slot MicroBox Industrial Card Cage PC Chassis.

According to the Branford, Conn., company, they were designed for use in embedded applications where space is limited.

Pricing starts at $275.

▶ *CyberResearch*
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**Mylex Corp.** has announced SCSIVision, a CD-ROM to help make SCSI devices easy to use.

According to the Santa Clara, Calif., company, SCSIVision was designed for new users who want to install, configure and learn about SCSI peripherals. The CD includes multimedia tools and games to enhance learning.

SCSIVision costs $99.

▶ *Mylex*
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# HAL systems

CONTINUED FROM PAGE 45

The new systems are a good fit in the high-end electronic design market, which involves applications such as logic simulation and application specific integrated circuit design, said Ron Ranauro, president of Blackstone EDA, a value-added reseller in Worcester, Mass. "It's a good product for memory and space-hungry applications," Ranauro said.

HAL Computer Systems in Campbell, Calif., is a fully owned subsidiary of Japanese company Fujitsu Ltd. It has tried to carve a niche for itself in the Sun Microsystems, Inc.-compatible workstation market by offering aggressively priced 64-bit architectures based on SPARC chips manufactured by Fujitsu.

**64-bit workstations**

For instance, HAL was the first to ship a 64-bit SPARC chip early this year and was the first to ship a 64-bit version of Sun's Solaris operating system, preceding Sun to market.

HAL's systems typically have cost at least 30% less than comparable systems from other vendors of 64-bit systems, such as Digital Equipment Corp. and Silicon Graphics, Inc. (SGI).

Despite HAL's aggressive prices and early entry in the 64-bit market, analysts don't expect the company to be much more than a niche player in the workstation market. So far, there is only a limited demand for 64-bit workstations. And HAL, a relative newcomer to the workstation market, will have a hard time competing against long-established vendors such as Hewlett-Packard Co., Sun and SGI, analysts said.

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## Networked storage

CONTINUED FROM PAGE 45

age systems. And EMC Corp. in Hopkinton, Mass., recently announced shipment of its Symmetrix Multihost Transfer Facility (SMTF) for moving data between host and LAN systems [CW, Oct. 28].

Other storage vendors are still trying to attack the file-transfer issue. IBM offers system-to-system transfer utilities. And along with Storage Technology Corp., IBM sells SnapShot copy, mainframe-only software that creates views of data rather than copying the data itself.

Previously, users wanted to share data to look at historical business information stored on different systems, according to a report by The Clipper Group, Inc. in Wellesley, Mass. But competition and growing use of data warehouses in the business world have pushed the time element of sharing data to the fore for users such as Dvorak.

DataShare avoids transferring files by using shared data regions in Encore's Infinity storage system. Data on the open system partition is accessed by the mainframe as a 3390 MVS or VSE volume or data set. And mainframe data is presented to open systems platforms in ISO 9660 CD-ROM format.

EMC takes a different tack. SMTF, used with EMC's Symmetrix storage subsystem, still performs file transfers but does so over faster data channels rather than over the network.

"When data warehouses were in experimental mode, the volumes were modest, and problems weren't showing up," said Mike Kahn, CEO of Clipper. "But now, shoving 200G bytes down a small [network] pipe creates a problem if you can't do it in the wee hours of the morning."

That's why the Pepsi bottler opted for DataShare. With multiple gigabytes of Pepsi's operational data, converting that data from a mainframe to open systems servers would take too much time and couldn't be done over a weekend when the network is less busy, Dvorak said.

> **"Shoving 200G bytes down a small [network] pipe creates a problem if you can't do it in the wee hours of the morning."**
> **— Mike Kahn, The Clipper Group**

Unix or Windows NT servers can't directly read mainframe data (or vice versa), thus requiring a file transfer via tape or over the network. That usually delays access to the file and can bring a network to its knees if the file sizes are large.

"This is our operational data. We're doing a 100% conversion off the mainframe. As we bring all this data over, it has to remain available," Dvorak said. Pepsi-Cola General Bottlers is converting to Hewlett-Packard Co. high-end Unix servers.

## Big iron

CONTINUED FROM PAGE 45

terprise computing sites, said Edward Carr, manager of enterprise systems research at Aberdeen.

And for shops that lean toward open systems, the mainframe is opening up.

For example, IBM's OS/390 mainframe operating system now has Unix application programming interfaces that enable the mainframe to support Unix applications without programming changes. And newer, air-cooled CMOS mainframes are smaller and easier to manage than older, water-cooled models.

But new big iron comes with an old desktop PC problem. "The only problem with CMOS is it is like PCs — it is changing every year," Carr said. That observation supports a recent trend IBM has spotted: More users are signing leasing contracts rather than buying the new machines outright [CW, Oct. 28].

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Which is dumber — network computers or PCs? Frank Hayes asks, **60**

# Multimedia game serves as training tool

By Julia King

NASA wouldn't dream of sending astronauts into space without having them take a few practice spins in a flight simulator. The idea is for pilots to learn from their mistakes on the ground to prevent a catastrophe beyond the clouds.

Project Challenge, a PC-based, multimedia training tool, gives information systems project managers a similar chance to head off disaster.

Jointly developed by MCI Systemshouse, Inc.'s Online Knowledge Group and simulation software maker Thinking Tools, Inc., the CD-ROM-based software simulates a wide range of variables a manager is likely to encounter during the course of a project. These include everything from managers continually adding new requirements and cost overruns to missed deadlines, grousing end users and a development team that lacks necessary skills.

The training occurs in a computer game-like atmosphere that simulates all the trappings of a project manager's work environment — right down to a group of disgruntled project team members huddled around a box of doughnuts in the coffee lounge.

Prices range from $1,495 for a multiuser, single workstation version to $20,000 for a site license.

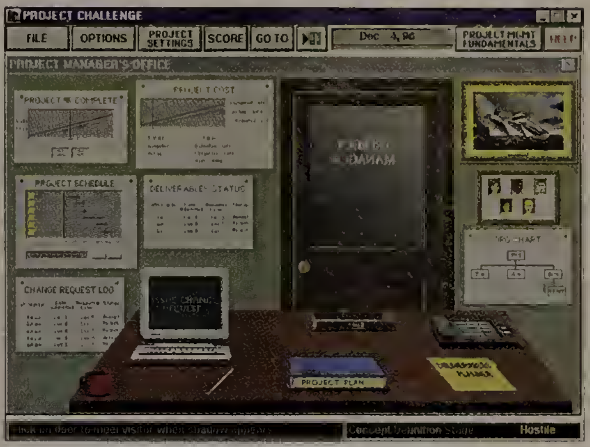
Before starting the game, trainees define their practice project environment by setting any combination of about 10,000 parameters, including overall budget, a development team's skill level and whether the project has support from upper management.

Another option is to set one of three practice levels, which escalate from benign to average to hostile.

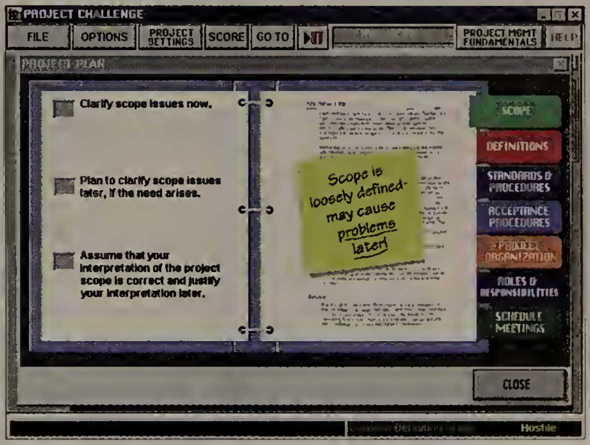
From there, "you start the game, and the clock starts ticking with you looking into the environment through the project manager's eyes," said Diane Switzer, a product director at the Online Knowledge Group.

"It allows you to build on and learn all of the skills you need to manage in real life but without the risks of fail-

**Game,** *page 54*



**Project Challenge** *surrounds trainees with the trappings of a project manager's work environment*



Clarify scope issues now.

Plan to clarify scope issues later, if the need arises.

Assume that your interpretation of the project scope is correct and justify your interpretation later.

Scope is loosely defined- may cause problems later!

**Once a problem is diagnosed**, *trainees can simulate real-time adjustments to contain disabling events*

# Tools to get Java perking faster

By Sharon Gaudin

Sun Microsystems, Inc. is trying to fix one of Java's biggest problems — its speed, or lack thereof.

"It's just really too slow," said Larry Lettieri, group manager of Sun's desktop and networking products. "The earliest reviews of Java focused on the speed, and sometimes when they said [it's slow], they were being generous. We've already improved the speed by a factor of more than three, and we're still working on it."

Sun isn't the only one aware of the need for speed. Users are waiting — not so patiently — for it.

"Like everybody else, I'm still one of those people asking for better development tools," said Larry Hagerty, Java senior systems analyst at the GTE Data Services subsidiary of GTE Corp. in Tampa, Fla. "Sun does have a Java Development Kit, but it's a little too sluggish, too slow for real intensive work. Microsoft's J++ I like real well. We haven't really settled on one tool to use companywide yet because we think it's too early."

Lyle Speirs, president of Black Diamond Consulting, Inc. in Portsmouth, N.H., said his company uses Java applets but not as much as it uses Microsoft Corp.'s ActiveX components.

**Java,** *page 54*

**Revving up Java**

Sun is adding the following technology to handle some of Java's speed problems

| NAME | FUNCTION | EXPECTED AVAILABILITY |
|---|---|---|
| **Just In Time compiler** | Analyze byte code and turn it into faster-running machine code | Q2 1997 (general); Q1 1997 (developers with Java Workshop) |
| **Native compiler** | Take byte code and permanently transform it into the fastest-running machine code | Q3 1997 or Q4 1997 |
| **Project Studio** | Build Java applications with drag-and-drop technology | Q2 1997 |
| **Project Ice-T** | Build and port client/ server applications for the Internet | Q2 1997 |

# Office 97 app targets small businesses

By Lisa Picarille

Microsoft Corp. is attempting to find ever-smaller market niches to dominate with its Office suite of productivity applications. The company last week announced it is readying a version of its forthcoming Office 97 aimed at small businesses.

### Microsoft suite

Due out early next year, Office 97 Small Business Edition will include the latest versions of Microsoft's word processor, spreadsheet, desktop publishing, desktop information manager and browser. In addition, the Small Business Edition, which targets companies with fewer than 100 users, also includes Automap Streets Plus and Small Business Financial Manager. Users will also receive one free month of Internet connection time through The Microsoft Network.

IDC/Link, a market research firm in New York, estimated that there are 6.7 million small business in the U.S. Those companies have fewer than 100 employees and usually lack information systems departments or employees that are specifically dedicated to dealing with technology.

Office 97, *page 56*

**Software included in Office 97 Small Business Edition**

- Word 97
- Excel 97
- Publisher 97
- Outlook 97
- Internet Explorer 3.0
- Automap Streets Plus
- Small Business Financial Manager

# Tool links maps, database

By April Jacobs

Using geographic analysis to enhance corporate marketing research may be a little easier with standard database technology and MapInfo Corp.'s newest SpatialWare technology.

SpatialWare links the company's traditional desktop mapping software with Oracle Corp.'s relational database software. It lets users incorporate into database files geographic information that can be called up in any query for information or analysis.

Home Savings of America, FSB in Irwindale, Calif., one of the largest savings and loan institutions in the U.S., is planning to use the product to link geographic data with financial data and other traditional forms of information. It will use a mix of data to help assess real estate loan risks and sell new types of loans and credit lines to existing customers.

Andy Barker, a programmer analyst at Home Savings, said once the bank is able to get all of its information onto a single database, applications that are now separate can be integrated.

Customer geographic information, for example, that resided on a desktop or server can be matched up with nonspatial data to give a more in-depth profile of it.

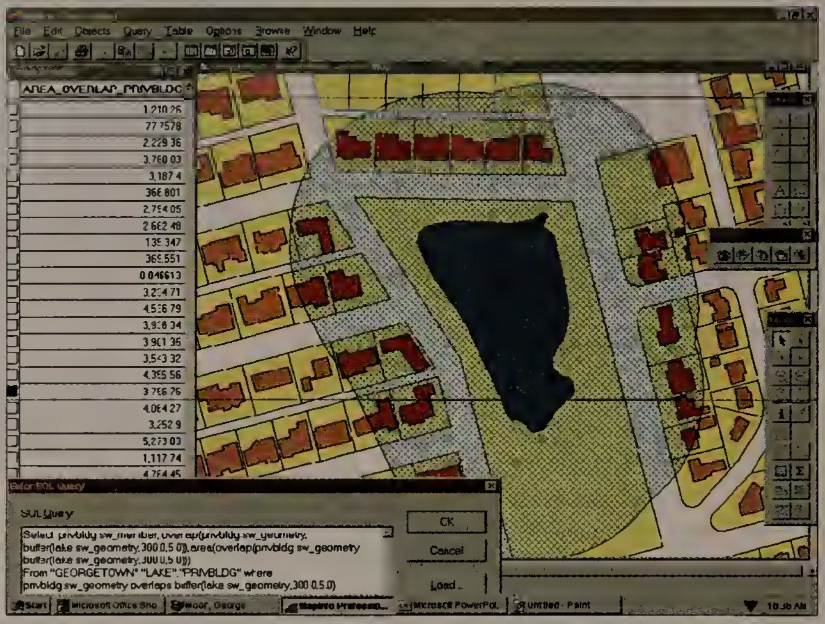
"We already have maps on the desktop and corporate data on the server. Now we want to get it all onto one database and centralize our applications," Barker said.

Using SpatialWare software, a user can include queries about location in a standard query to an Oracle database.

For example, Home Savings will be able to look at a region to determine not only relative property values, but also any financial risk factors associated with that area.

SpatialWare is available immediately and priced at $25,000 for a workgroup configuration and up to $200,000 for an enterprisewide configuration.

The initial release will run on SunSoft, Inc.'s Solaris as well as on SCO, Inc.'s UnixWare.



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Select prvbldg.sw_member, overlap(prvbldg.sw_geometry,
buffer(lake.sw_geometry,300,0.5,0)),area(overlap(prvbldg.sw_geometry
buffer(lake.sw_geometry,300,0.5,0))
From "GEORGETOWN"."LAKE","PRVBLDG" where
prvbldg.sw_geometry overlaps buffer(lake.sw_geometry,300,0.5,0)
```

**MapInfo's SpatialWare** *allows map images to be called up from traditional databases and cross-referenced with appropriate statistics for analysis*

# Multimedia game

CONTINUED FROM PAGE 53

ing in real life," she said.

It also does so with a sense of humor, said Danny Somlo, a beta user and IS manager at Consumers Gas Co. in Toronto. One of Somlo's favorite touches in the program is a simulated painting of a schooner on the wall of the project manager's office.

"Depending on how you're doing, the ship can go from calm waters and smooth sailing to being struck by lightning," Somlo said. Other progress cues include a drooping potted plant in the coffee room and a scowl on a manager's face.

"It's a unique tool. You see your project moving ahead and your dollars being consumed, then there are various scenarios that get thrown at you, like a staff member quitting," he said.

"It's sort of infectious. When I spent half a day with it, it seemed like half an hour," Somlo added.

Jim Janiak, senior manager of methodologies and systems at Comdisco, Inc. in Rosemont, Ill., said he is considering buying the tool in order to train the company's disaster recovery planning consultants.

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# Java to perk up

CONTINUED FROM PAGE 53

And a big part of the reason for that is Java's speed, Speirs said.

"It's still pretty immature, and it's a lot slower," he said. "It'll speed up, though. That's coming."

### Up its sleeves

Sun plans to pick up Java's pace with some first-quarter additions and the next version of the Java Development Kit.

The following is what Sun has in store:

- **Project Speedway** is the code name for a set of Sun projects aimed at making Java a faster language. One piece of the project centers around a Just In Time (JIT) compiler, which sits in the Java Virtual Machine and converts byte code into faster-running machine code on the fly. Otherwise, the code has to be interpreted by the Java Virtual Machine, which vastly slows processing.

The JIT compiler will be added to Java Workshop in the first half of next year, Lettieri said. Developers who already have Java Workshop will receive the compiler during the first quarter.

Sun is also working on a native compiler, which will take the byte code and turn it into the fastest-running machine code. The native compiler differs from the JIT compiler because the transformation is permanent, so the process won't have to be continually repeated.

The native compiler is expected in the second half of next year, according to Lettieri.

"The first versions of Java were built for portability, not speed," Lettieri said. "We have put together a team to build Virtual Machines that will go deeper into the operating system and run faster."

- **Project Studio** is Sun's concept for building Java applications with drag-and-drop technology. This will let programmers who don't know Java build Java applications and will speed up the process for experienced Java programmers.

Project Studio is slated to ship in the first half of next year.

- **Project Ice-T** is aimed at building client/server applications that can be deployed over the Internet and porting existing applications over the Internet, as well. Project Ice-T is also expected to ship in the first half of next year.

## New Products

**Franklin Quest Co.** has announced Ascend 97, personal information management software that uses the Windows 32-bit operating system.

According to the Salt Lake City company, Ascend 97 features new productivity tools, including a link with U.S. Robotics Corp.'s Pilot electronic organizer. Microsoft Corp.'s OLE 2.0 attaches files and objects to tasks and appointments, and Microsoft Rich Text editor provides formatting abilities.

The cost is $99.95. Registered users of Ascend 5.0 can purchase the upgrade for $39.95.

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# Office 97 targets small businesses

CONTINUED FROM PAGE 53

Jeffrey Tarter, editor of "Softletter," an industry newsletter in Watertown, Mass., said Microsoft's choice to label the product for small businesses may backfire.

"Calling it the Small Business Edition is the kiss of death," Tarter said. "It's condescending. It implies an underpowered product. It emphasizes the seller is really a big corporation that is more comfortable talking to other big corporations. Corel has been successful with small businesses because it never refers to them as small businesses."

One small business owner said that if the program was powerful and easy to use she wouldn't be offended by its name.

"However, I would want to make sure that it is not underpowered compared with other programs because I have purchased applications that didn't grow with my company," said Joyce Ogletree, president of Luv Homes/Number One Realty, Inc., a Lilburn, Ga., real estate agency and building company with four employees and 55 subcontractors.

"But if it were powerful but simpler, that would be great. I am an old grandma who wants to spend my time running my company not figuring out all this technology," she said.

To help users figure out how technology can help them run their businesses, Microsoft also plans to offer a handful of supplementary products and information that target specific needs of small businesses.

The Redmond, Wash., software company plans to offer a video series, called America At Work, that shares methods for using technology to create a successful business venture.

**Suite topping**

Microsoft Office remains the best-selling suite package, with 66.3% of the overall shipments in the suite market.

Microsoft has also established a toll-free hotline, (800) 60SOURCE, where small businesses can get product information and business referrals. There will also be a monthly online magazine aimed at small businesses (www.microsoft.com/smallbiz/).

### Vying with Corel

Tarter called Office 97 Small Business Edition a direct response to rival Corel Corp.'s suite success in the retail market. Corel has a 50% market share of retail sales of suite products, according to PC Data, a Reston, Va., market research firm.

"Corel has been successful because it puts lots of stuff in the box and sells it for a low price," Tarter said.

The price of Office 97 Small Business Edition is expected to be on par with the cost of Office 97 Standard Edition, which has yet to be determined. But users can upgrade to the Small Business Edition from a single Microsoft application, a competitive suite or a rival Works integrated package for $249.

The street price is estimated at less than $200.

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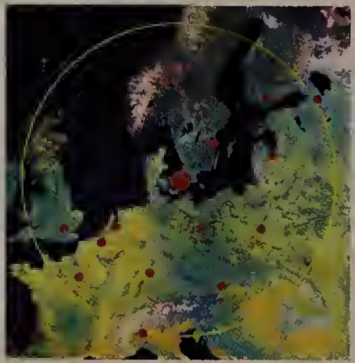

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# Defense Department reconsiders Ada mandate

By Gary H. Anthes
WASHINGTON

Prompted by a blue-ribbon panel of software experts, the U.S. Department of Defense may be ready at last to back away from its decade-long insistence that all new systems be coded in the Ada programming language.

A committee of the National Research Council (NRC) in Washington said the Pentagon should strengthen its commitment to Ada for "war-fighting" systems but consider other languages for down-to-earth applications.

**Language class**

| | Ada | C | C++ | 3GL* |
|---|---|---|---|---|
| **Cost per line of source code** | | | | |
| Information systems | $30 | $25 | $25 | $40 |
| Weapons systems | $150 | $175 | Not available | $250 |
| **Defects per 1,000 lines of source code** | | | | |
| Information systems | 3 | 6 | 4 | 6 |
| Weapons systems | 0.3 | 0.8 | 0.6 | 1 |

Source: Reifer Consultants, Inc., Torrance, Calif.

*Cobol or Fortran

Although Ada isn't widely used in the private sector, the NRC panel offered advice to systems engineers in the corporate world. It said language choice isn't as important as it once was and pales in comparison with other considerations.

"If I have a Web client interacting with a Web server — or any client/server system — the critical feature is that they interact through certain protocols," said William Scherlis, an NRC committee member and a computer scientist at Carnegie-Mellon University in Pittsburgh. "Implementation languages don't matter."

### The ultimate language

But in the 1970s, they did matter. Burdened with systems written in 450 languages, the Pentagon designed Ada as the programming language to end all programming languages. In 1987, it mandated Ada for all software development, and now some 50 million lines of Ada software are used in the Defense Department.

The rich and powerful language was designed to accompany modern software engineering practices, thereby leading to increased programming productivity and more error-free and reusable code.

Despite pockets of success, Ada never really caught on in the private sector. As a result, software vendors have developed applications, tools, utilities and interfaces primarily for other languages.

For that reason, Ada will remain a niche player in the nonmilitary world, relegated to use in "high assurance," real-time systems, Scherlis said.

"Ada unequivocally gives you advantages in reliability," said Barry Boehm, chairman of the committee that drafted the report and director of the Center for Software Engineering at the University of Southern California in Los Angeles.

For systems that require real-time processing and high reliability, such as software that guides a missile, Ada is the best language to use, Boehm said.

Commentary

# Network computers vs. PCs: Which is dumber?

Frank Hayes

How dumb are network computers compared with PCs?

PC cheerleaders like to sneer that network computers are just this year's flavor of the dumb terminal, a way for mainframe bigots to recreate past glories and strip the intelligence of real computers off users' desktops.

Maybe so. But PC cheerleading and mainframe bigotry have nothing to do with the thing that matters most these days for corporate IS departments: money — the money it costs to build, manage and support mission-critical network applications.

And an unhealthy fixation on any technology — whether it's PCs, mainframes or network computers — will end up costing you plenty.

### The tough route

FTD figured that out the hard way, according to Bill Phelan, the company's technology chief. FTD started building its Mercury network for ordering flowers long distance in 1978. By 1985, there were 17,000 dumb terminals in FTD florists' shops. But in 1991, the company started swapping 10,000 of them for PCs, hoping to give florists more functionality — which is what PCs should be good at, right?

And FTD has tried twice recently to upgrade those character-based 386 PCs to run even more powerful software. But all upgrades have been unqualified disasters.

In its most recent showpiece effort, dubbed Mercury 5000, the company tried to install $8,000 high-end multimedia PCs, complete with two CD-ROM drives, a high-end sound card and whiz-bang applications for showing customers flower arrangements.

But member florists didn't see any real business advantage in what the multimedia applications offered. Forget it, they said — and FTD wrote off about $200,000 in software development costs, Phelan says.

Before that was Mercury 4000, a more modest plan to upgrade the florist shops to 486-based PCs. But those computers turned out to be incompatible with FTD's proprietary order-entry software — which the company discovered after buying 1,000 machines. FTD ended up eating the cost of the PCs — another pricey fiasco.

Even adding those 10,000 PCs in 1991 was a cost/benefit blunder. Replacing terminals with PCs tripled the network's yearly costs, and the PCs never delivered any real added benefit.

Now FTD hopes network computers will bring the economics — and the software — of the Mercury network back in line with what both FTD and the florists need. The company plans to distribute thousands of JavaStations from Sun Microsystems at about the same price dumb terminals cost it a decade ago.

FTD will get rid of the high-overhead PCs in the florist shops. Member florists will get graphical Java applications that FTD can upgrade frequently.

### Cost factors

Yes, shifting to network computers will cost plenty. FTD's developers will have to write client/server applications in Java. And FTD will replace its dial-up network with a private intranet, plus a backup network to handle secure transactions. But the money FTD saves by getting rid of those 10,000 PCs will pay for a lot of network upgrades and new Java applications.

So for users such as FTD, it's simple. Network computers are cheap. PCs are expensive. That makes network computers smart — and PCs really, really dumb.

---

Hayes is *Computerworld*'s staff columnist.

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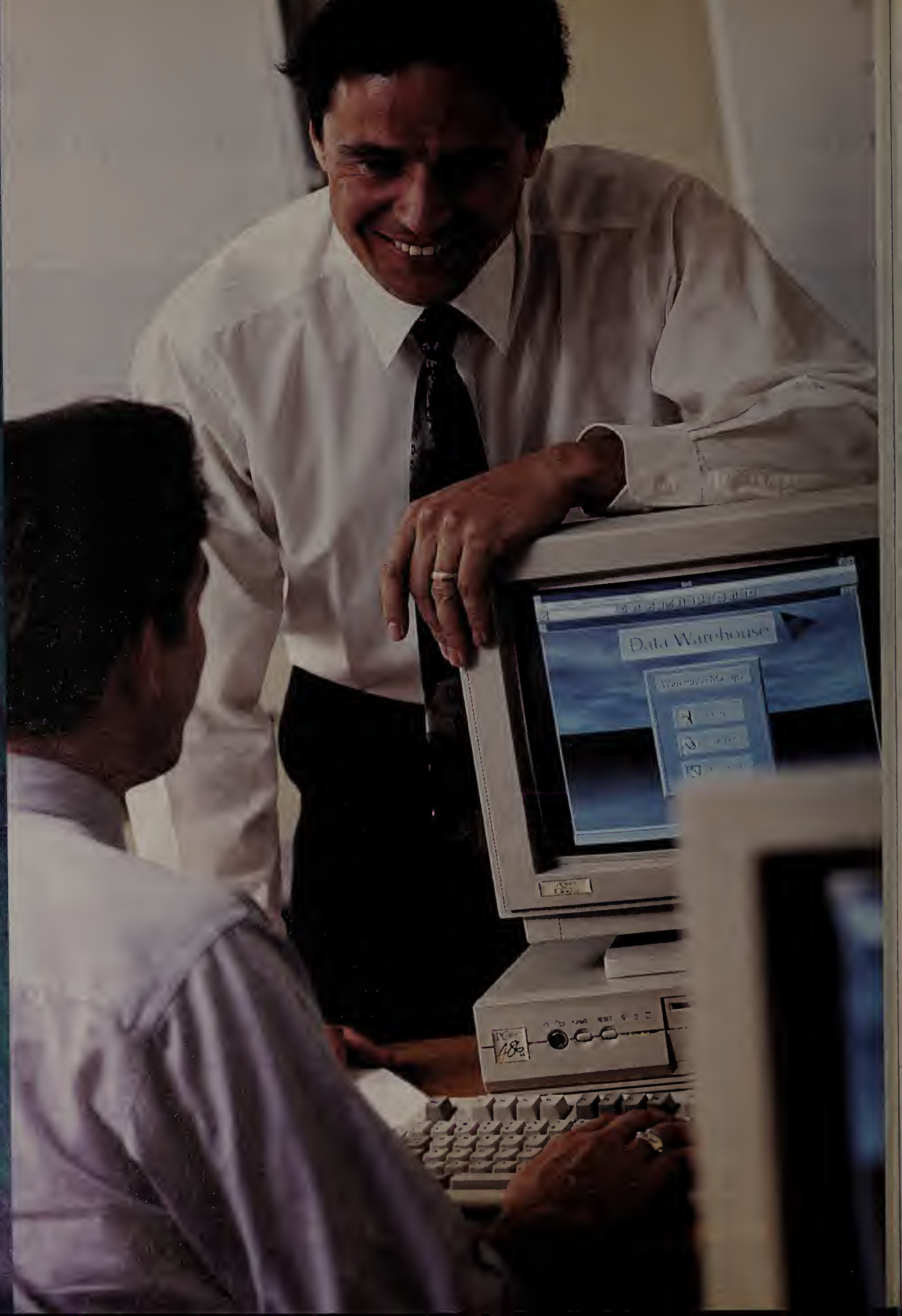

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# Fine for initiated...

## But IntranetWare install tough for newbies

By Garrett Michael Hayes

Novell, Inc. has assembled an attractive bundle of optional and previously independent features and packaged them under the name IntranetWare. Unfortunately, it's still a bundle rather than a truly integrated package.

Although none of the installation procedures are strange to experienced NetWare administrators, they remain idiosyncratic enough to trouble those new to NetWare or the concepts of the Internet.

**Not quite there**

The administration tools are better than earlier NetWare releases, but they aren't yet streamlined enough to qualify as single-point management.

For those who already have a significant investment in NetWare and want to connect to the Internet or provide intranet services within their organization, IntranetWare delivers an appealing list of features at a supportable price. But it is doubtful that this rewrap of existing features will motivate others to adopt the Novell strategy.

We set out to determine how easy IntranetWare is to install, configure and use. We installed it on a Dell Computer Corp. Power-Edge 2100/200 server and set up some Windows 95 clients. The server had a single Pentium Pro processor and 6G bytes of disk storage.

Because the internetwork-

Review, *page 66*

# Server tune-up helps NT, NetWare efficiency

By Patrick Dryden

**Systems management**

Just as a car runs rough and wastes fuel if it has an improperly tuned engine, so too can client/server applications perform poorly when the configuration of their servers is out of whack.

That is the situation BMC Software, Inc. hopes to address for managers who must maintain the two most popular types of PC servers.

The Houston-based systems management vendor has upgraded its NetTune Pro tool to handle a mix of file and applications servers. NetTune Pro Version 3.0 now analyzes performance and adjusts parameters for servers based on Windows NT as well as Novell, Inc.'s NetWare.

Some other tools, such as LANDesk Manager from Intel Corp., can monitor both servers. But NetTune Pro distinguishes itself by making changes to server configurations either automatically or according to a schedule.

And although some tools can tune NetWare or Windows NT servers, NetTune Pro handles both. It can also make automatic adjustments and initiate a string of commands after capturing an alert.

Beta-tester Jack Engle II, an independent consultant for Chicago-based Corporate Computer Science, used the new version to find performance bottlenecks between NetWare file/print servers and Windows NT database servers before deploying new applications throughout a large insurance company.

"Now I can set event thresholds to take action, like paging me

NetTune, *page 70*

# IntranetWare gets cool reception

## Users don't take to Web server/operating system combo

By Laura DiDio

In the two months since Novell, Inc.'s glitzy introduction of IntranetWare at Networld/Interop '96 in Atlanta, users' response has been tepid at best.

Novell's IntranetWare and Microsoft Corp.'s Windows NT Server are racing hard to be the network operating system with the best front end for the World Wide Web.

But Microsoft appears to have the early edge based on its high-profile marketing and the tight integration between Windows NT and its Office and BackOffice software suites.

**All-in-one package**

IntranetWare is a Web server/network operating system package. It includes NetWare 4.11, the Novell Web Server and Novell's Internet Access Server.

The Internet Access Server provides wide-area network connectivity and routing and acts as a gateway between NetWare's IPX protocol and the Internet's TCP/IP.

IntranetWare also includes licensed copies of Netscape Communications Corp.'s Navigator browser.

Still, Orem, Utah-based Novell hasn't followed up the introductory hype with a substantive IntranetWare road map.

That has cast doubt among users and analysts that Novell will move beyond the file server and compete with Microsoft and Netscape in the Internet/intranet market.

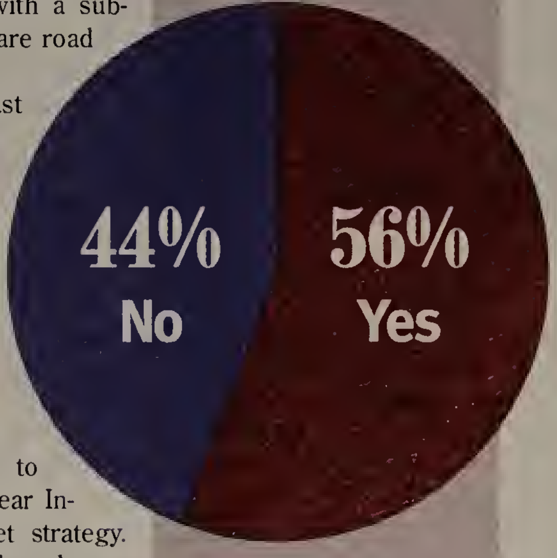
"I want Novell to come up with a clear Internet and intranet strategy. So far, I haven't heard one. Unless or until I do, I'm sitting tight. I'm not going to upgrade to NetWare 4.11 or IntranetWare, but I won't switch to Windows NT Server either," said George Halkias, a database analyst at Johnson & Johnson Ethicon, Inc. in Somerville, N.J., a wholly owned subsidiary of Johnson & Johnson, Inc.

Gary Wilkerson, program and external services admin-

IntranetWare, *page 70*

**By next August will you have Windows NT Server installed alongside NetWare?**

Base: 250 NetWare sites



Source: Computerworld Research, Inc.

## Poll: NetWare users staying put

A recent survey of 100 self-described NetWare loyalists indicates that even stalwart Novell users aren't flocking to the IntranetWare platform.

The poll, conducted by Computerworld Research, Inc., indicates that only 23% of the users have considered using IntranetWare. The remaining 77% said there was either no chance or just a slight chance they would use NetWare as their intranet server in the next 12 months.

But the outlook for IntranetWare isn't totally gloomy. David Moschella, senior vice president of research at *Computerworld*, said many users are biding their time to see how Novell executes. "While users aren't rushing to embrace IntranetWare, they're also not tossing NetWare out the door. So IntranetWare still has a shot," Moschella said.

Keith Thibodeau, LAN manager at United Companies Lending Corp. in Baton Rouge, La., a longtime NetWare user, said his company is leaning toward Microsoft's Windows NT Server as its intranet platform but hasn't totally discounted IntranetWare.

"Novell only recently began talking about its intranet and Internet strategies. Now they're billing IntranetWare as the basis for all future Novell operating systems. We need to be sure they're for real. But if they can deliver, we may be interested," Thibodeau said.

*— Laura DiDio*

# Integration missing from IntranetWare

CONTINUED FROM PAGE 65

Novell's presentation of IntranetWare, we worked primarily with those installation and administration functions for these aspects of the product. Novell's core file-and-print services were not re-examined for this test.

**In the box**

The IntranetWare package includes four CDs. The first contains the core NetWare 4.11 product, with the traditional NetWare file-and-print services centered around Novell's flagship Novell Directory Services (NDS).

This basic product includes the NetWare Web Server and a copy of Netscape Communications Corp.'s Navigator browser.

The remaining CDs contain the Novell Online Documentation; the Novell Internet Access Server, which provides NetWare Multiprotocol Routing, WAN connectivity and the Novell IPX/IP Gateway; and the Novell FTP Services, which provides a file transfer protocol (FTP) server and a management tool.

**Installation**

Novell has made some minor improvements in the installation process for NetWare 4.11, primarily in the area of device detection.

On our server, NetWare correctly detected our network adapter and offered us an appropriate list of drivers from which to choose. Unfortunately, it didn't recover that well from our mistake when we bypassed the list and tried to go back to it.

We ultimately had to install the network driver ourselves after finishing the base installation.

A nicely laid-out set of Quick Start and User Guide cards walked us through the process of installing the NetWare Web Server, NetWare/IP, the Online Documentation and the workstation client software.

But the documentation requires some revision to match the state of the product. It appears that some of the visual-aid cards were assembled unchanged from the components of IntranetWare when they were separate products. For example, the installation card for NetWare Client 32 for Windows 95 gives instructions for installing from a CD that doesn't come with the package.

To successfully install the clients, we had to create installation diskettes at the server and carry them from workstation to workstation. If we wanted to upgrade existing clients, we could have done so from the server. But this was impossible for a new client, which obviously has no existing way to reach the server.

There were other minor irritations in the installation process. It would have been useful if the installation process could have loaded the drivers that provided network access to our CD-ROM drive.

We also wondered why it is still necessary to install the Online Documentation Library from a workstation even after the CD-ROM drive was available at the server. Overall, however, the few problems were easily overcome by applying a little NetWare or Internet knowledge.

We installed the Web Server and FTP software with almost no special configuration required, unlike with NetWare/IP. A point of advice: Schedule installation during off-hours if this is an upgrade to a production system. As with most NetWare products, and more so than with competing products, it will be necessary to shut down and restart the server several times during the process.

Overall, the installation process is disjointed. Although Novell has put all the pieces of IntranetWare in a single box, the company has yet to make installation as guided as it is with its most visible competitor, Microsoft Corp.'s Windows NT Server.

At times, the installation software presents the administrator with lists of optional pieces to install or items to configure, but it gives little clear guidance as to what purposes the options serve.

For example, we generated a set of NetWare Client 32 Administration disks which, as it turned out, didn't seem to have anything to do with administering 32-bit clients.

An experienced NetWare administrator will probably take the additional options in stride even without having a carefully laid-out path. A novice installer, however, will likely be seriously befuddled.

Procedures that were effective for installing a core product and a few options don't work well for the number of permutations presented in the IntranetWare package.

**Grades for Novell's IntranetWare**

| | |
|---|---|
| FEATURE SET | B |
| INTEGRATION OF ADMINISTRATION TOOLS | C- |

**Administration**

Novell includes a new version of the NWAdmin utility with NetWare 4.11. The application interface is similar to the one that shipped with versions of NetWare 4.x, but the new version introduces two new features.

The first is the ability to view and manage multiple NDS trees. The second, more interesting feature is the ability to select multiple objects, such as users or groups, and make mass changes to their configuration.

Novell also includes an XConsole utility for remote management of the server across a TCP/IP connection.

The concept is identical to the Rconsole utility for remote IPX administration, with which NetWare administrators are familiar.

**Connecting an intranet**

IntranetWare supplies three major pieces required for connecting an existing NetWare network into an intranet or the Internet.

A World Wide Web server, an FTP server and a gateway between Novell's native IPX protocol and the Internet-style TCP/IP networks provide the basis for calling the bundle IntranetWare.

This combination will enable a company to present Web pages and make files available for transfer either on an intranet or the Internet.

Users can then access information through standard, Internet-style tools, such as a Web browser or FTP client.

Once installed, the Web Server product can be basically a hands-off operation.

Place your Hypertext Markup Language (HTML) documents in the appropriate directory, and they are visible to anyone with a browser and an Internet Protocol connection to the server. You may do this on an intranet or the Internet if the NetWare LAN has been connected to the outside world.

Because the Web Server is only a delivery mechanism (there are no special tools for developing Web content), it makes no difference which Web browser a user has. But a version of Netscape Navigator is included with the client portion of the package.

An administration utility helps to set up some logging options and allows or restricts access to user home pages.

A plug-in facility for NWAdmin allows an administrator to associate a personal Web page and photo image with each user in the NDS tree.

**Danger sign**

Warning: The Web Manager features an NDS Browser that can be enabled with the click of a mouse, and it is a powerful mouse click.

With this simple action, an unwary administrator can expose the entire NDS tree to the outside world.

By default, this information includes everything that a user inside the network could see, including the names of users, servers, network resources, organizational units, the roles of individuals within organizations, groups, and even the IPX addresses of network nodes.

There are instructions for limiting the information that may be browsed, but applying this depends on administrators understanding the relationship between trustees and rights to properties — one of the more powerful and less understood aspects of NDS management.

But by default, this information is handed out across the Internet without so much as a guest log-in.

**Java support**

For the adept and adventurous, there is support for Java applets as well as for a scripting language called NetBasic.

The Java support delivers applets across the network but doesn't include tools for creating applets.

The documentation for the Web Server, Java and NetBasic is contained in a series of HTML documents that are stored in the default Web content directories when the Web Server is installed.

Wary administrators will want to move those files before installing their own Web pages rather than simply overwriting them.

**Internet Access Server**

The bane of most NetWare administrators who want to connect their users to TCP/IP-based resources has always been the need to run two protocols at each workstation.

The TCP/IP configuration has been labor-intensive. Now, Novell provides its IPX/IP Gateway, which allows an IPX-only workstation to run applications normally dependent upon TCP/IP for connectivity.

The Gateway process runs on a NetWare server, while the workstation runs a special version of Winsock that translates between the protocols.

By adding another snap-in addition to the NWAdmin utility, the administrator can control the level of access to Internet resources for each user, including time of day and access to specific resources.

This approach can simplify life for many administrators. But for some users, especially those with modem lines, it may simply intensify the battle among various versions of Winsock.

Power users who have modems at the desktop may find that they lose their connection to CompuServe or a private Internet provider after installing the NetWare client.

**Package or bundle?**

The combination of elements in IntranetWare seems to be less of a new product than a bundling of several previously available Novell products in a single box.

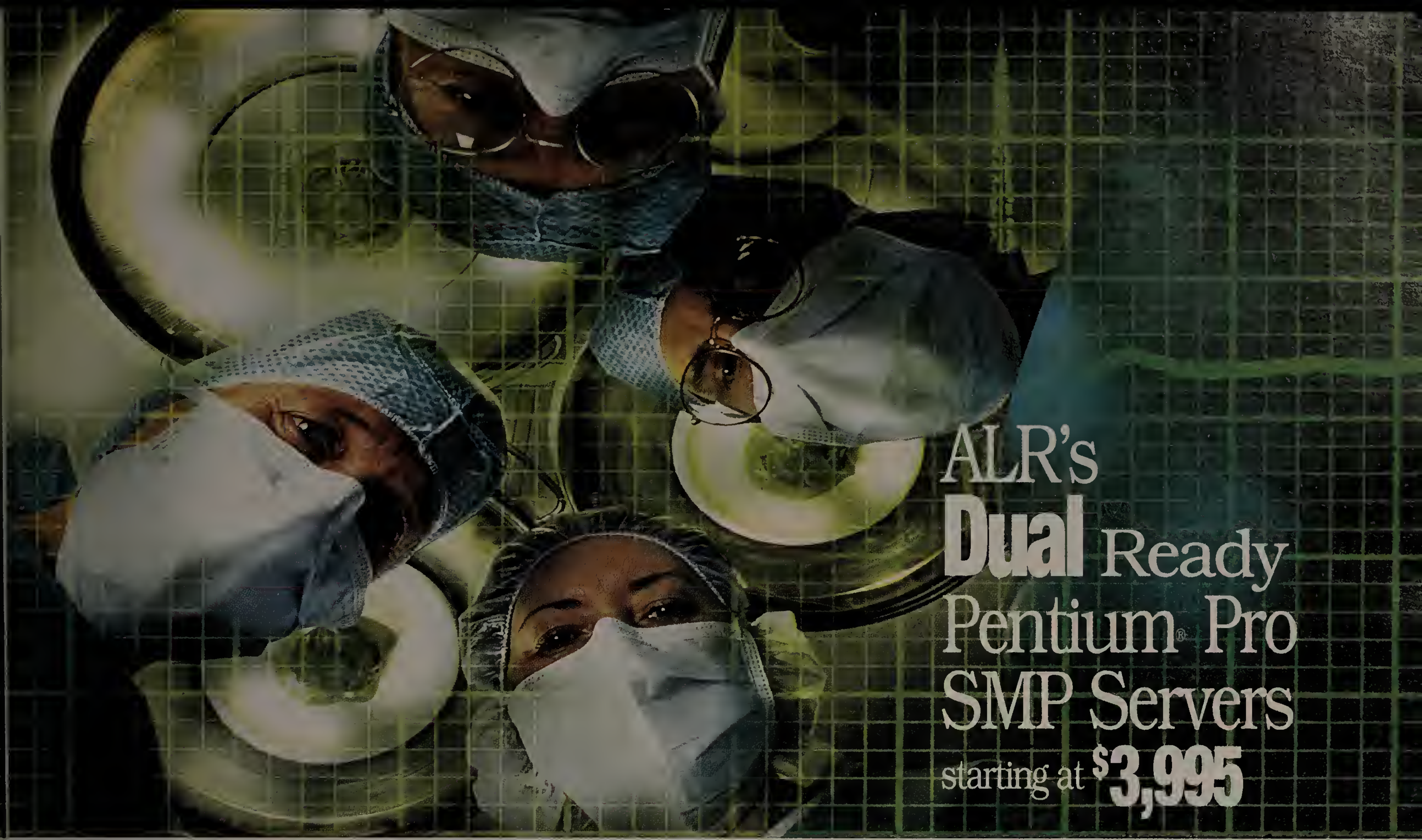
Novell's decision to continue selling NetWare 4.11 as a separate product underscores the fact that there isn't anything fundamentally different here.

What Novell has done, and with fair success, is identify a useful suite of its existing add-on products that extends the connectivity of existing NetWare networks into the world of intranets.

This popular combination at an attractive price is likely to be well-received. The next step will be to streamline the bundle into a true package.

---

Hayes has been designing and managing NetWare and other LANs for more than 10 years. He is systems controls manager at Client/Server Labs (www.cslinc.com) in Atlanta. Client/Server Labs is a primary test lab partner for *Computerworld*.



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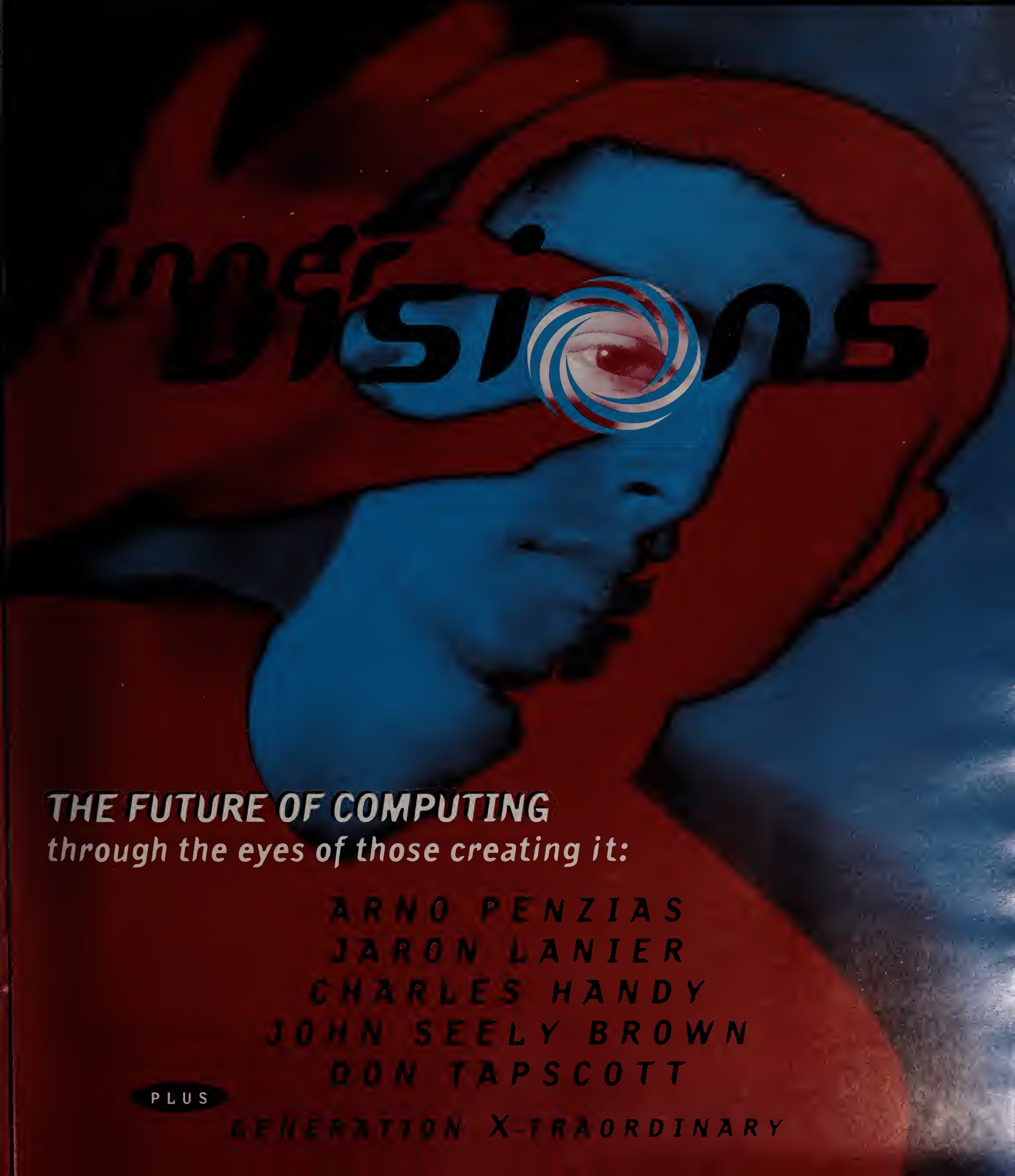

# inner visions

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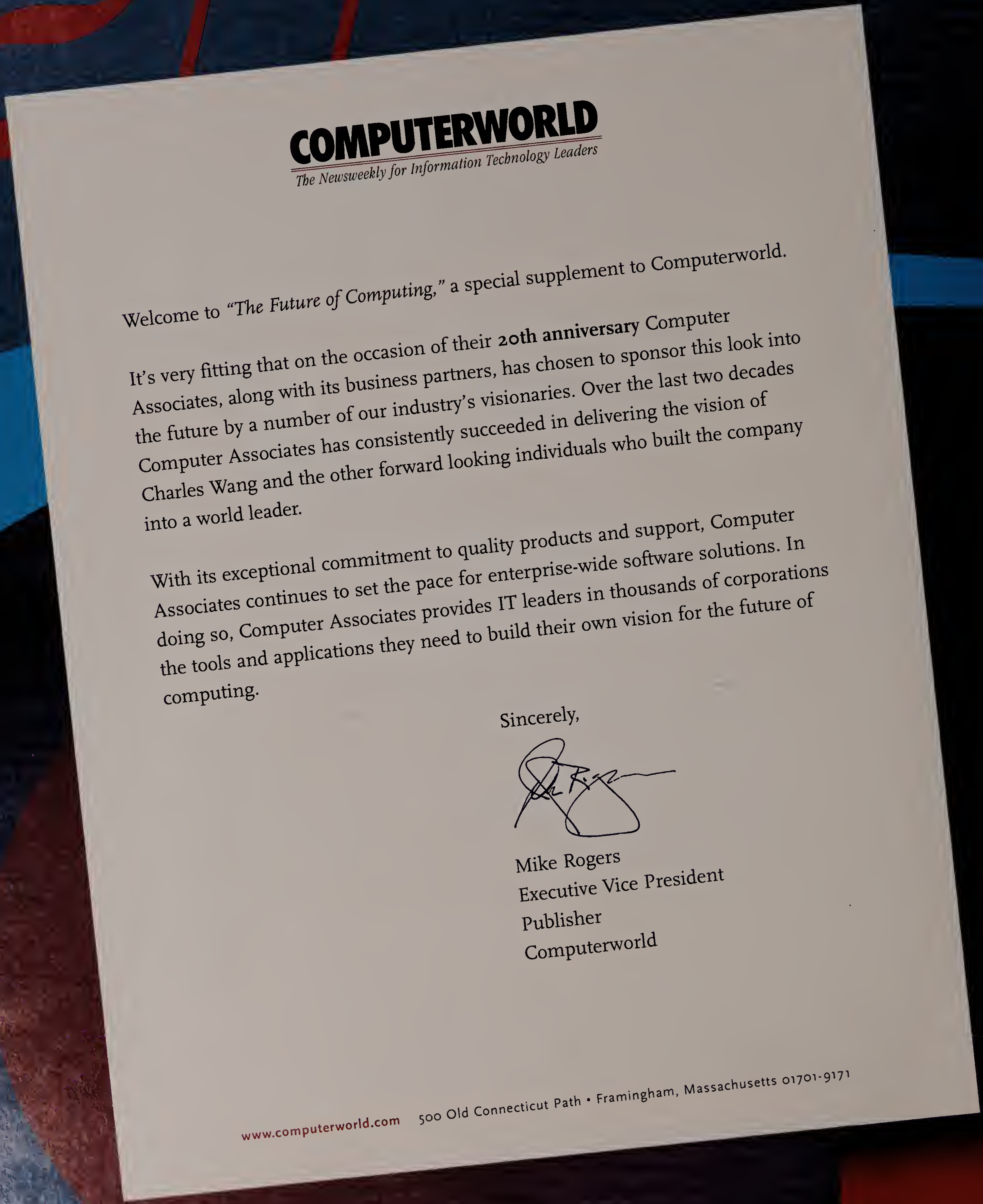

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# inner Visions

## contents

s/2 **ARNO PENZIAS**

by Bill Laberis

*Collision Ahead*

"You can extrapolate any technology to the 14th decimal point, and you still won't get the answer to the future. What you have to discover is what the technology is going to collide with," says Bell Labs' Nobel prize-winning chief scientist. Want to know how the Internet explosion happened? Penzias explains this and predicts the next *big bang*.

s/6 **JARON LANIER**

by Glenn Rifkin

*Hand in Glove*

He didn't *predict* the virtual reality field, he *fathered* it –at the tender age of 24. He also saw millions of dollars flow into – and out of – his hands. Now 12 years older and wiser, this self-made Renaissance man foresees a world of virtual cities by 2025, where well-paid, high-tech "bicycle messengers" will navigate massive, complex databases for the rest of us.

s/9 **CHARLES HANDY**

by Ron Condon and Bill Laberis

*British Umpire*

He may hold court on the other side of the Atlantic, but Britain's preeminent management "thinker" could trade visions of the future with both Thomas Jefferson and Adam Smith. Instead, he's trading his views on business federalism, corporate efficiency and outsourcing with chief executives from around the world.

s/11 **JOHN SEELY BROWN**

by Alice LaPlante

*Of Mice and Zen*

"Business process re-engineering is backfiring," says the esteemed director of Xerox PARC. "Attempts to put mission-critical applications on client/server architecture are turning out to be little more than automating the sales force." CIOs are not to blame, Brown says, but they *are* in a position to transform and save their companies in the next decade. He points to some unusual places for the answers.

s/16 **GENERATION X-TRAORDINARY**

X

by Joseph Maglitta

*Roundtable*

Companies that want to harvest prizes from the current crop of twentysomething superachievers may have to exchange desks for poolside lounge chairs. This handful of technology-savvy hotshots doesn't hesitate to forecast the technology winners and losers for the 21st century.

s/19 **DON TAPSCOTT**

by Brian S. McWilliams

*Economics 0001 0000 0001*

The man anointed "the world's leading cyber-guru" by Vice President Al Gore predicts half the human population will be on the Internet by 2025, and its impact on our lives will surpass all previous revolutions in human communication. But don't get smug. The 'net has nearly as much potential to destroy existing businesses as it does to create new ones, Tapscott warns. The future will be kind to CIOs who understand the digital economy and cruel to those who do not.

### Inner Visions Staff

Project Manager: **Bill Laberis**
Managing Editor: **Kathleen Gow**
Copy Editor: **Pat Erickson**
Art Director: **Clifford Stoltze**
Designer: **Wing Ngan**
Photoshop Wizard: **Joe Polevy**
Cover Photography: **Craig MacCormack**

Editor of *Computerworld*: **Paul Gillin**
Managing Editor, Magazines Group: **Joyce Chutchian-Ferranti**

## inside

**"Punch a hole in the sky."**

That's what test pilot Chuck Yeager was told just before a mission-critical flight in his supersonic jet in the movie *The Right Stuff.* Go where no human has gone. Let in new light. Show us the future.

So it is with humankind. We are obsessed with the future, that obsession being a peculiar mixture of anticipation, curiosity and dread. Thus, we put our faith in the hands of a very small number of people to show us the light shining from that far-off dimension we call tomorrow.

We asked a group of futurists to punch a hole in the sky and give us a glimpse into the future of computing and information management.

The composite image derived from their individual visions is a daunting one, to say the least. If there is one overarching piece of advice they impart, it is this: Don't hang on too dearly to the world you have come to know, because it is going to change dramatically from the inside out.

For one thing, information management in the enterprise will move once and for all beyond the role of "cost reducer" and into the forefront of business strategy. That's right. Information management will not only enable new and daring businesses but, correctly used, will be at the vanguard of shaping business strategy. That's the way author and business futurist Don Tapscott sees life in IS unfolding in the next 10 years.

John Seely Brown, the unconventional head of Xerox PARC, and Jaron Lanier, the *very* unconventional father of virtual reality, claim business will look far afield to disciplines like music, anthropology and linguistics in setting the course for IS to follow in the next century.

Arno Penzias, whose research confirmed the big bang theory of the universe, foresees collisions of near-galactic proportions overtaking the world of IT and profoundly altering your world. And from his favored perches outside London and in Tuscany, organizational seer Charles Handy takes the enterprise leagues beyond its quarter-to-quarter gyrations to a brave new world of true individual empowerment — aided and abetted by the information network.

You'll also hear from a group of five young men destined for IT leadership. How will their idealism be reconciled with the cold, hard reality of tomorrow's dawn?

Peer inside these pages. The bright light within emanates from that hole punched in the great beyond by our visionaries.

Bill Laberis
Project Manager

*Within a decade, says Arno Penzias, there will be millions of cable modems in operation, and we'll be talking to our refrigerators.*

*Whether it's the universe*
*or the Internet,*
*the world as we know it is*
*shaped by things that*
*go* ***BANG!*** *in the dark.*
*Predicting the collisions—*
*now that's the hard part.*

# arno PENZIAS

## collision ahead

by Bill Laberis

The Internet is the single most significant phenomenon in computing history. More is written about 'net-related subjects than about any other aspect of information technology. Yet, what is today an all-consuming passion for many was just three years ago confined largely to academic and research ghettos. No one predicted its near-term impact. No one.

"That's because you can extrapolate any technology to the 14th decimal point, and you still won't get the answer to the future," says Arno Penzias, chief scientist at AT&T's Bell Laboratories in Murray Hill, N.J. "What you have to discover is what the individual thing, like a technology, is going to collide with. You have to figure out what's going to bump into what. Then, maybe you've got something."

The Internet? By itself, a boring network. It was around for 20 years before the Mosaic browser appeared.

Then, it banged into something else, namely "all that great middleware that allowed ordinary humans to make searches without having a detailed knowledge of each of the parts of the 'net," Penzias says. "What gives the Internet impact is not part of the Internet at all, but a different technology it ran into: The use of object-oriented programming. It was an unexpected combination."

Collisions. Resultant explosions. The dust settles. Something new, often unpredictable, is born. Much like the universe, itself the result of an unfathomable explosion or "big bang" that Penzias was able to prove actually happened, earning him a Nobel prize in 1978. So it's small surprise that Penzias' visions of the future are shaped by theories about technologies banging almost randomly into each other, giving rise to new advances.

Penzias' earliest memories are those of a Polish refugee, whose family fled from the result of the greatest and most catastrophic collision in human history, World War II. He can wax philosophical, almost poetic, about technology, lifelong education and vacations he is planning with his fiancee. But strike a nerve, like government cuts in research funding, and out pops the occasional unprintable expletive. At 63, Penzias is the product of cultural collisions and, thus, remains a little Europe, a little Brooklyn.

His two decades' experience as the head of vaunted Bell Labs would further cement his thesis that great leaps in technology occur not when individual technologies are birthed but when two or more technologies collide.

AT BELL LABS 30 YEARS AGO, ARNO PENZIAS TRIED TO CLEAN UP SOME FUZZY RADIO SIGNALS HE WAS MEASURING FROM ANOTHER GALAXY. HE COULDN'T. BUT FROM THAT FRUSTRATION HE DEVISED WHAT WOULD BE A NOBEL PRIZE-WINNING THEORY: THE DIRTY NOISE WAS RADIATION LEFT OVER FROM THE "BIG BANG" — THE COSMIC EXPLOSION THAT CREATED THE UNIVERSE. AT&T THEN DID THE RIGHT THING AND MADE PENZIAS THE HEAD OF BELL LABS. TODAY, AS BELL'S CHIEF SCIENTIST, HE THINKS, TRAVELS, LECTURES AND WRITES BOOKS. COLLISION THEORY STILL DOMINATES HIS VIEWS OF TOMORROW.

"You can extrapolate any technology **to the 14th decimal point,** and you still won't get the answer to the future. What you have to discover is what the technology is going to collide with. Then, *maybe you've got something.*"

Penzias observes that many collisions occur, but few produce anything lasting or substantial. The reason? Few products of collisions "work with" other things, he explains, which is the real measure of these collisions, and the real measure of anything. The collision of the 'net and object-oriented programming worked with advances in data communications, sharp declines in PC hardware costs and storage prices, and the demands of universal data access.

### *Warning! Next Collision Due*

Does Penzias see any new measurable collisions out there? He certainly does. It's going to be a big one, too. You know all those silly info appliances that are cropping up? Things like smart phones, network computers, TV set top boxes — even the home PC. By themselves, Penzias notes with apologies to Gertrude Stein, "there's not much 'there' there."

However, these techno-geek and hobbyist items just happen to be on a collision course with what Penzias calls the "negative cost of networking." The result? A huge new industry that he labels "home orchestration." And if you don't think there are broad implications here for IS professionals, think again.

But first, a word of explanation about Penzias' curious "negative network" costs. "It will simply cost more to make stand-alone things than to make networked things," he says. The stand-alone items each require mechanical interfaces, storage, backup, some means for updating and so on. All such requirements, he says, will disappear when products are networked from the start.

### *New ways to shop*

So perhaps the network costs aren't literally negative, but there will be great potential economies realized when these various info appliances are networked to each other. Industries will be born, and some will boom. Others will be transformed.

Like what?

"Take home shopping, which today is a toy. You call someone and basically ask them to have someone else push a shopping cart down the aisle," Penzias says. "But when you have a million customers instead of a few thousand, then you design a new supermarket with heavy automation to do the picking up for you, like a factory. Then, when you have 30 or 40 customers on a block, you can afford to go back to the old milkman thing with an inexpensive delivery route."

More specifically, within 10 years, most refrigerators will include an optical reader on the door, as well as a microphone, Penzias says. Polish off the last gulp of milk, zip the container's bar-coded label past the infrared reader and say "buy two more" into the mike. That information goes via the new home network to the home PC, which adds it to your shopping list and phones in the order. Thus, the collision of negative networking with info appliances totally changes a commodity shopping market — the back end of which must be totally overhauled by IS to accommodate these changes.

All within 10 years.

What about the network outside the home, the one connecting all those appliances to the outside world? What medium will transport the home orchestration market?

Here, Penzias is on home turf — data communications — and he is very confident. "There will be direct broadcast satellite, affordable, too. Fiber links will be brought in by new providers. Fixed wireless of many different kinds. T1 lines cost a lot today, but they won't tomorrow. And the cable companies aren't going away," he maintains. "You'll use them all, or in some combination.

"Everyone I know is producing cable modems," he continues. "Ten years out, sooner I am sure, there will be millions of [cable modems] in operation. There will be a multiplicity of communications devices and of communications vendors and a host of new communications clients, all brought to you by the negative cost of networking bumping into these information appliances."

What about asynchronous transfer mode (ATM), the data transport medium about which Penzias said just a few years ago "a solid consensus is building"? Well, sometimes things go bump in the night, and sometimes they don't. ATM today is no longer a big deal to Penzias. There are other, more significant, collisions going on, like that of frame relay and the products of the white-hot switching vendors.

Today, and probably through the end of the decade, IS will connect its networks with fast Ethernet or with frame relay, he says. "I'm less interested in ATM today because people have worked around it. They will continue layering the net connectivity problem with more technology. The important thing is that these big frame-relay networks are throwing billions of bits around the country, and people who have them are happy.

"As a phone guy," he says, "I didn't give enough credit to the computer side of things. So instead of throwing communications technology at the problem, users and vendors like Cisco Systems, Inc. will throw computing technology. Works just fine, too."

### *Changes in store for IS*

So the negative cost of networking will spur entirely new markets — home orchestration being one — while giving massive boosts to others. IS, meantime, will find itself wrestling with the monumental task of retrofitting existing systems and networks to accommodate the change wrought by these seemingly random collisions. What will happen to the IS organization itself?

Penzias agrees, to a point, with the observation of New York-based The Research Board that centralization and the proliferation of network technology go hand in hand. In the next few years, he says, companies will begin to seriously address the hidden costs of computing. These costs are embodied in data from the consulting firm Gartner Group, Inc. in Stamford, Conn., which pegs the five-year cost of owning a single networked PC at about $45,000.

Controlling runaway costs will require standardization — that is, central IS control over critical elements of the IS infrastructure.

"To take advantage of the negative cost of networking, you will have to make sure everyone is using the same version of the apps," Penzias asserts. "And, dare I say it, you can use the network to ..." Penzias halts, as if trying to clear a bone from his throat. "You can use the net in the future to set standards for the behavior of employees, to normalize their activities. I think maybe 'control' is a strong word, but you get the idea. You must guide the behavior of people. The network will allow you to do that."

And how will such attempts to normalize business behavior (for example, to ensure workers aren't 'net surfing when they should be working) square with the upcoming generation of workers, those current teenagers who are reviled by the thought of anyone curbing their cyber activities?

The future in this regard is no different from the past, Penzias says. Certain kinds of jobs with certain work rules will attract certain kinds of people. "Some employees won't tolerate certain things, others will," he says.

Ultimately, for Penzias, what people will or will not do, what of significance will or will not happen, comes down to math and chance and random collisions.

ISDN, he notes, has been talked about more than any other technology that has yet to happen. Penzias has had an ISDN line in his New Jersey apartment for five months and still can't get it running.

"There are no standards. And if you try to do an extrapolation of when something like ISDN would become a standard, you'd get the wrong answer, which we did with ISDN," he says. It just hasn't had the benefit of a good, hard collision yet. And maybe it never will.

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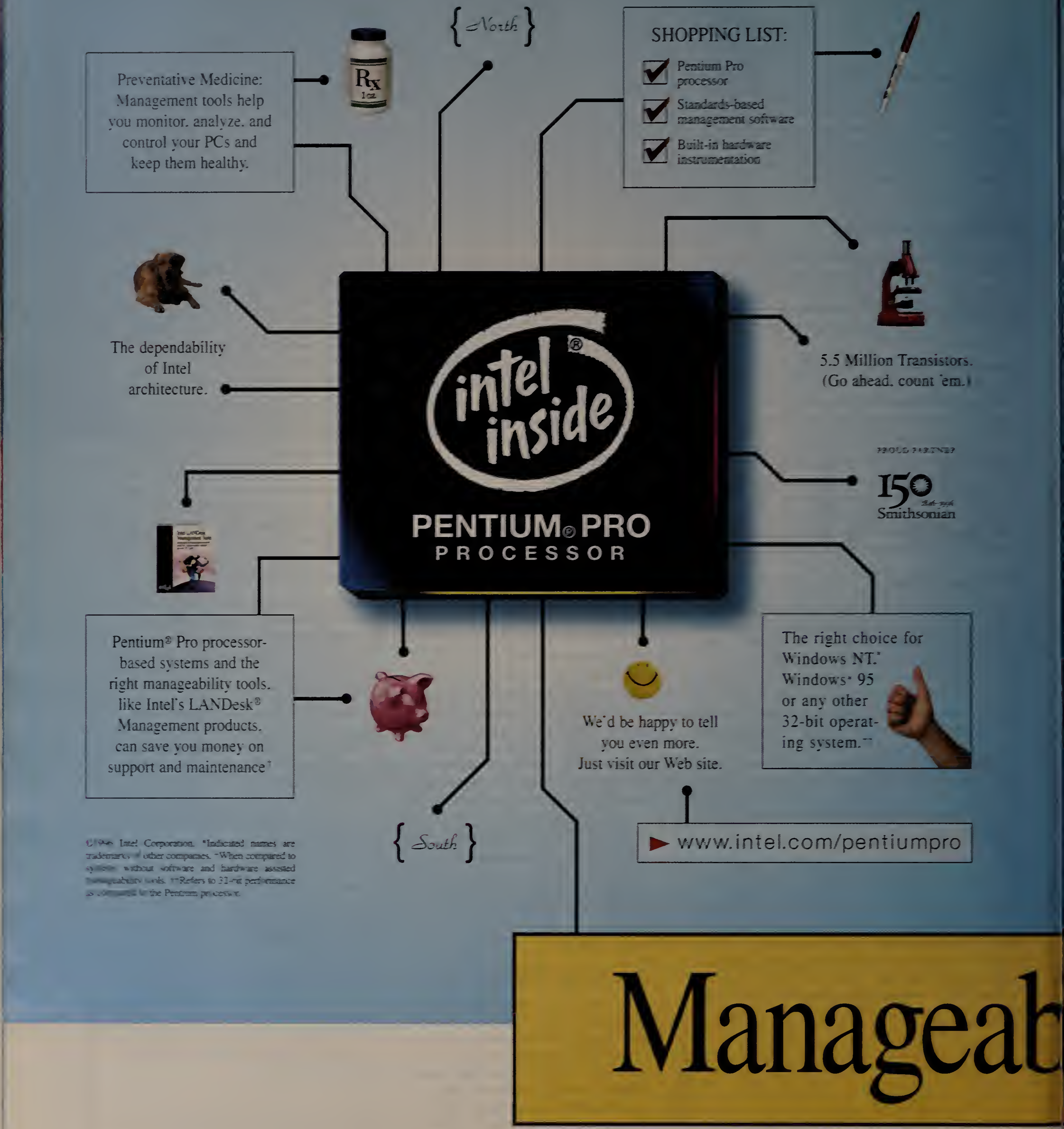
Editor in chief of *Computerworld* for 10 years, LABERIS is now principal of Bill Laberis Associates, a custom publishing and media consulting firm based in Holliston, Mass.

photo by Steven Borns



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**The Boy Wonder of virtual reality sees a world of virtual cities where well-paid, high-tech "bicycle messengers" will navigate a grid of massive, complex databases for end users and execs alike.**

# jaron LANIER

## hand in glove

by Glenn Rifkin

*Jaron Lanier, who practically* invented *virtual reality, admits his efforts to commercialize the technology were premature. In fact, its time is still to come, he says.*

IN 1984, AT THE TENDER AGE OF 24, JARON LANIER WAS THE COVER BOY FOR *SCIENTIFIC AMERICAN*, IN A VIRTUAL SENSE. MORE SPECIFICALLY, THE COVER STORY FOCUSED ON A PECULIAR PROGRAMMING LANGUAGE CALLED EMBRACE, A HIEROGLYPHIC TONGUE THAT WOULD BECOME THE LINGUA FRANCA FOR THE WORLD OF VIRTUAL COMPUTING. THE HIGH SCHOOL DROPOUT FROM NEW MEXICO PARLAYED HIS LANGUAGE CREATION INTO VPL RESEARCH, INC., THE FIRST COMMERCIAL VENTURE TO EXPLOIT VIRTUAL REALITY. BUT EVEN HIS FORTUNE WOULD BE VIRTUAL. HE MADE AND LOST "TENS OF MILLIONS," BY HIS RECKONING, WITH NONE OF IT FLOWING THROUGH HIS HANDS.

LANIER, THROUGH IT ALL, REMAINS THE CONSUMMATE VISIONARY.

In the steamy 1994 film *Disclosure*, starring Michael Douglas and Demi Moore, virtual reality made a cameo appearance in the techno-thriller's pivotal scene. Douglas' character, searching for crucial information to save his career, enters a corporate database using virtual reality goggles, glove and a 3-D representation of a file cabinet in which the sensitive data is stored. Buoyed by special effects, the virtual world is stylishly eerie, ominously futuristic.

"I viewed it as a validation of our concept," says Jaron Lanier, the visionary who tried to commercialize virtual reality in the 1980s. "Usually, you take a movie about technology and have to add a sex scene to keep the audience in place. Here, you had a movie about sex and you had to add a virtual reality scene to keep the audience interested."

In truth, Lanier says, the movie's vision was "preposterous." He says users are too sophisticated to want virtual reality representations of file cabinets. The assumption that users want only electronic versions of familiar things, such as file cabinets and Rolodexes, is wrong, Lanier insists. Virtual reality's whole reason for being is to take advantage of new ways of visualizing complex data. "Users want tools that take maximum advantage of their cognitive abilities," Lanier says.

Jaron Lanier. A man of voracious appetites. Physically imposing, with Medusa-like, waist-length red dreadlocks cascading over a spreading girth, he doesn't so much contemplate a universe of concepts and philosophical theories as ingest them whole. Eyeing the future as a gastronomic smorgasbord of possibilities, Lanier takes big bites and savors each one.

In fact, by the year 2025, Lanier foresees massive, complex databases of the future as virtual cities — 3-D visual representations with neighborhoods that a programmer or database operator will get to know in the same way they get to know the place where they live. The cities will be very quirky, Lanier explains, not with superclean lines like cities in sci-fi films, but with different textures, sensibilities and even smells, like real cities.

### Making sense of complexity

Right now, he says, cities are our best example of group learning of very complicated things. Even long removed from a particular city, someone returning will quickly recall places and ways to get around, despite the complexities and amount of detail required. As a database — not the simplified sci-fi view of *Disclosure*, but in the real world — data flow, control flow, dependency and other relationships between objects would be represented as streets. The city would be somewhat flat, but not two-dimensional. There would be levels of underpasses. Bird's-eye views are possible, and each part of the city would be ornamented with specific sights, sounds, textures and smells to assist in recalling large numbers of neighborhoods.

Naturally, within such an environment, the roles of information technology professionals would have to change dramatically. Lanier predicts a significant restructuring of the IT profession with new job titles and new capabilities. "Employment in the future, particularly in this field, will be the equivalent of what artificial intelligence can't do," he says.

So far, AI can do very little, and Lanier doesn't expect that to change radically any time soon. But if it does, he says, so will employment. Many current job descriptions will vanish, and a new class of AI oversight positions will open up. "If AI got very good, even those jobs would vanish, leaving no job open for humans but that of stockbroker or manual laborer," Lanier says with a laugh.

In these supercomplex databases, made viable by virtual reality interfaces, there will be a cadre of people whose talent is running through the virtual cities and finding information. Lanier equates this profession with "bicycle messengers" in today's cities. "Their job will be to act as translators between the way people on the outside world remember the data and the way it is represented in the city/database," he suggests.

Lanier resists the notion that virtual reality will enable end users to act as their own bicycle messengers in these cities. Douglas' character in *Disclosure*, for example, couldn't possibly have negotiated such complex databases so easily. The cities will be too complex for any visitor to traverse easily and quickly, thus opening the door for specialists whose deep knowledge of a particular database will keep them in demand.

"The complexity will be such that there won't be just one virtual city that holds all the world's databases. There will be many, many different cities," he predicts.

But a generation of bicycle messengers? Lanier quickly points out that this is just one layer of IT. In other areas, Lanier predicts less dramatic change. Software in the future, he says, will continue to be "messy enough that we can always count on a well-paid layer of people dealing with the problems of integrating legacy systems. That's probably the safest employment bet for the next millennium."

Surprisingly, the 36-year-old Lanier, whose name became synonymous with virtual reality in the early 1980s, currently is removed from the often frustrating attempts to commercialize virtual reality — a technology, he says, whose time is still to come. The rendering hardware simply wasn't robust or cheap enough to give birth to the market. "It still isn't," Lanier adds.

Since childhood, the iconoclastic Lanier has floated contentedly at the edges of the mainstream, eyeing the potential of computers with the seasoned wisdom of a visionary far beyond his years. A high school dropout who later took college courses in mathematics and computer science, he is passionate about technology's impact on society, on democracy, on the economy.

Just recently, for example, Lanier began working with a German humanitarian group that is building computer systems to help de-mine areas infested with anti-personnel land mines. He is thinking about how to use virtual reality techniques to help visualize sensor fusion problems in detecting the mines.

"They've been programmed to evade detection by people like us, the people who went to computer science school," Lanier says. "In order to really clear an area, technology is needed." Lanier's work involves using virtual reality to combine information from different mine sensors into a heads-up display to help de-miners find their quarry with greater efficiency.

Passionate about his lifelong crusade to transform programming from an esoteric art form for a select priesthood into a vernacular craft for the masses, Lanier insists programming techniques must, and will, change radically in the 21st century.

"Right now, we're essentially using a software development paradigm from the Fortran era," he says with amazement. Lanier believes there are two complementary approaches that can be applied to creating a better user interface and software development methods. The first is to improve the machine representation of complexity to create better tools for analysis and manipulation. The second is visualization, which improves the user interface so that the user can understand, remember and manipulate complex structures more easily. That is where virtual reality comes in.

### No magic bullet

But the change will be very gradual, "maybe not even in my lifetime," Lanier says. "This is a genuinely hard problem. Different solutions will emerge and succeed or fail in varying degrees. There will be no single magic bullet, no headline that screams 'Today Software Got Easy.' "

Thus, the current generation of IT professionals won't experience enormous change, Lanier says. Revolutionary change won't occur for the simple reason that the consensus weight of IT as it stands today will prevent massive shifts from happening.

Gradually, though, the profile of IT professionals who design internal databases and networked corporate systems will begin to resemble the young people of today who are designing corporate Web sites; people who combine traditional IT skills with a creative bent.

But, again, such change will be slow. With the brittle nature of software, he warns, the IT profession must, by its very nature, be conservative. "So I don't expect these changes to happen overnight," Lanier states. "They are not going to happen on the clock of new technologies, which would be very fast, but rather on the clock of human generations, which is rather slow."

**Software in the future will continue to be "messy enough that we can always count on a well-paid layer of people dealing with the problems of integrating legacy systems. That's probably the safest employment bet for the next millennium."**

Lanier also envisions a dichotomy for chief executive officers and their relationship to the IT world, a relationship currently strained at best. On the one hand, he says, virtual reality systems should allow the CEO to better understand the potential of technology — "when you can see better, you can reach farther" — but, conversely, because increased visualization will lead to greater complexity, "the CEO might end up right back where he or she was before."

Instead, Lanier predicts a "Holy Trinity" corporate environment in which the CEO, CFO and CIO own equal layers of activity and each will be perceived as running the company "in a different cosmic plane."

For Lanier, the idea of virtual reality was based not on *Star Trek*-like images of the future but on the clearheaded vision of a superb computer scientist. Early on, he saw the potential of visualizing large, complex databases in three dimensions as a superior form of programming and remembering. It was a way, he theorized, to help users comprehend the "irreducible complexity" of large computer systems. Lanier believes that learning keyed to an environment — especially an environment in which one perceives one's body to be moving, such as in a corridor or on a street — is more effective for comprehending complex and abstract associations.

Lanier, in fact, can't seem to get enough complexity. "Give me more complexity," he yells, laughing. To that end, Lanier spends his time composing and performing what he calls "new classical music," along with writing, painting, teaching and even making movies. His first music CD, *Instruments of Change*, features Lanier playing dozens of exotic instruments from around the world along with the more conventional piano. He is a visiting scholar at both Columbia University, in its computer science department, and at New York University's Tisch School of the Arts.

Having created wider and wider circles within which to ply his various avocations and stretch his visions, Lanier is as content as anyone in the area of high tech.

"For our particular civilization, technology is our adventure, our frontier, our Wild West," he says. "We just love these new adventures, getting jostled and pushed by it."

photo by Dirk Westphal

**RIFKIN** is a freelance journalist based in Concord, Mass., who writes about technology.

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*His vision of the enterprise playing field of tomorrow is a montage of Jefferson and Marx, overlaid with lots of Adam Smith.* **Get ready for a new ball game.**

# charles HANDY

## BRITISH UMPIRE

by Ron Condon and Bill Laberis

It would be easy to dismiss Charles Handy's view of the future of the business enterprise as being Utopian or quasi-Marxist or even just plain nuts. In a day when corporations around the world are lopping off employees like scythers mowing a hay field, it is hard to envision a time 10 years out or so when both senior and junior employees will act as a voting block on major business issues such as "cost-containment re-engineering." That's a euphemism for mass layoffs.

But the heads of some of the world's biggest companies don't think Handy is nuts at all. In fact, they devour his books — which they must do as a prerequisite to meeting with him. They must also meet him at his home outside London before he'll see them on their turf. And they do, quite willingly, thank you.

Then, after listening to this apostle of business federalism, the chief executives of international behemoths go home and ponder just how they will approach their boards with Handy's unorthodox ideas about organizations. Because he touches them deeply, he probably frightens them, at a level no one else can.

*Wake up to a field of dreams or to a scene of "devastation." It's your choice, says Charles Handy.*

photo by Elizabeth Handy

"It's either a major rethink about the new types of work and property and all their implications, or it's waking up in the morning to a scene of devastation," Handy says. We're already getting a peek at this devastation, he says, in the form of knowledge workers and their managers who are either burned out or utterly lacking in the values that used to bind them to the old paternalistic companies of yesterday.

For IS, Handy's views hold forth a world of possibilities at a time when the IS profession is under siege in many quarters. Witness the continuing and increasing turnover of CIOs at U.S. companies, as evidenced by the recent annual survey of top information executives by Cambridge, Mass.-based CSC Index, Inc.

The world, according to Britain's answer to management guru Peter Drucker, is about to experience a decades-long "economic earthquake," which will forever topple all the old centralized, machine-age ways of doing things.

Replacing these companies that today are driven by short-term, often quarter-to-quarter financial statements, Handy says, will be companies run on a federalist model. Is Handy an apostle of Thomas Jefferson, too? Perhaps. In Handy's federal model, a small, central-core organization — headquarters — monitors the performance of highly autonomous business units. IT not only will provide the vehicle for speeding information out to the business units and, thence, to the knowledge workers, but will itself also be organized as a federation with a centralized core. Core IT may establish and enforce standards, but most of IT's functionality will be concentrated heavily in the outlying units.

Instead of devaluing workers, Handy insists, the successful and, therefore, the only surviving 21st-century companies — the federalists — will be those that grant more power to the real assets of the company — its workers. That includes giving senior, and even some junior, employees a voting voice in corporate strategizing. If you think the Marxist in Handy is beginning to show, keep listening. Part of Handy's vision of the next century sounds like capitalism with a capital C.

Organizations must continue to be ruthless in their search for efficiency if they want to survive, he says. Specifically, companies must halve their staffs every five years, paying the remaining half twice as much to be three times more productive. "It's a harsh but inescapable calculation," Handy claims.

Great deal for the half that gets its pay doubled. But what happens to the corporate castoffs? That's what's nice about Utopia. There's a place for everyone. The surplus staff becomes the core of 50% of the working population who, Handy says, by the year 2000 will be working outside the traditional organization. Doing what? Why, handling the increasing load of chores outsourced by the company.

These outsourced chores should not include mission-critical IS, though, he is quick to add. Handy says IS plays a pivotal role in the 21st-century corporation. "The information architecture is the nervous system of this new organizational model, and so the design and functions need to be finely tuned to allow the business to run smoothly," he maintains.

Which is precisely why Handy stands in steadfast opposition to the wholesale outsourcing of IT or critical elements of it. The 21st-century corporation will outsource those activities "that do not give the company a competitive edge," he says. "One of the few things that pulls [the corporation of tomorrow] together is the information and communications system."

Thus, information is a key competence that must stay firmly at home, within the company. "In my view, it is crazy to outsource IT," Handy declares. "Why give the design of the information architecture to someone else? They can't possibly know the organization as well as you do."

CHARLES HANDY'S BEST-SELLER *THE EMPTY RAINCOAT* LEVELED A BLAST AT THE DEHUMANIZING IMPACT OF THE '90s CORPORATION AND ITS TENDENCY TO REDUCE WORKERS TO THE STATUS OF REPLACEABLE PARTS. THE AUTHOR OF EIGHT OTHER BOOKS AND A FOUNDER OF LONDON BUSINESS SCHOOL LEFT A LUCRATIVE CAREER IN BUSINESS DECADES AGO TO BECOME "JUST A THINKER," WHO TODAY IS COVETED AS A CONSULTANT BY THE TOP BRASS AT THE BIGGEST OF COMPANIES. HIS IDEAS ARE RADICAL, EVEN FRIGHTENING, BUT ULTIMATELY HUMANISTIC.

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**CONDON** is a freelance journalist based in Bromley, England.
**LABERIS**, former editor in chief of *Computerworld* for 10 years, is principal of Bill Laberis Associates, a custom publishing and media consulting firm based in Holliston, Mass.

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# john seely BROWN

## Of Mice and Zen

*What the heck does a bunch of* **philosophers, musicians, artists** *and* **linguists** *have to do with the future of information management? Apparently plenty, if you believe the brain trust that gave us the mouse, the GUI and much more.*

by Alice LaPlante

Xerox Corp.'s Palo Alto Research Center (PARC) has long offered one of the clearest windows into the future of computing. And many point to PARC Director John Seely Brown as the most astute interpreter of the view from that vantage.

Within PARC's terraced white buildings, researchers have created such landmark technologies as the mouse, the graphical user interface and the Ethernet network topology. But today, Brown's vision of the future is not being shaped by computer scientists alone. Oh, they're here, but they're in a talented pool of 300 degree-laden individuals that also includes physicists, philosophers, linguists, sociologists, psychologists — even musicians and artists. "Our true breakthroughs seem to come in the white spaces between fields, when we put people together who have quite different points of view," Brown says. (See story, s/14.)

Ask Brown about the most exciting developments under way at PARC, and you'll hear less talk of network bandwidth than of corporate "communities of practice" and "social fabrics." Indeed, emerging technologies seem to interest Brown primarily in how they will influence and be influenced by social processes, within both commercial enterprises and the world at large.

AS DIRECTOR OF ONE OF THE MOST INNOVATIVE AND SUCCESSFUL INFORMATION RESEARCH LABS IN THE WORLD, JOHN SEELY BROWN IS MORE INTERESTED THESE DAYS IN HOW ARTISTS MAKE CREATIVE LEAPS AND HOW PEOPLE ACQUIRE KNOWLEDGE THAN HE IS IN THE LATEST ADVANCES IN PURE TECHNOLOGY. IT'S NOT THAT HE'S DISINTERESTED IN TECHNOLOGY. QUITE THE CONTRARY. AFTER SIX YEARS LEADING THE VENERABLE PALO ALTO RESEARCH CENTER, BROWN NOW BELIEVES THAT INTEGRATING VISIONS OF THE FUTURE OF INFORMATION TECHNOLOGY WITH DISCIPLINES SUCH AS ANTHROPOLOGY AND MUSIC PAINTS THE BEST VIEW OF IT IN THE 21ST CENTURY.

*The coffeepot is your friend. Encourage, don't squash "unauthorized" learning, says John Seely Brown.*

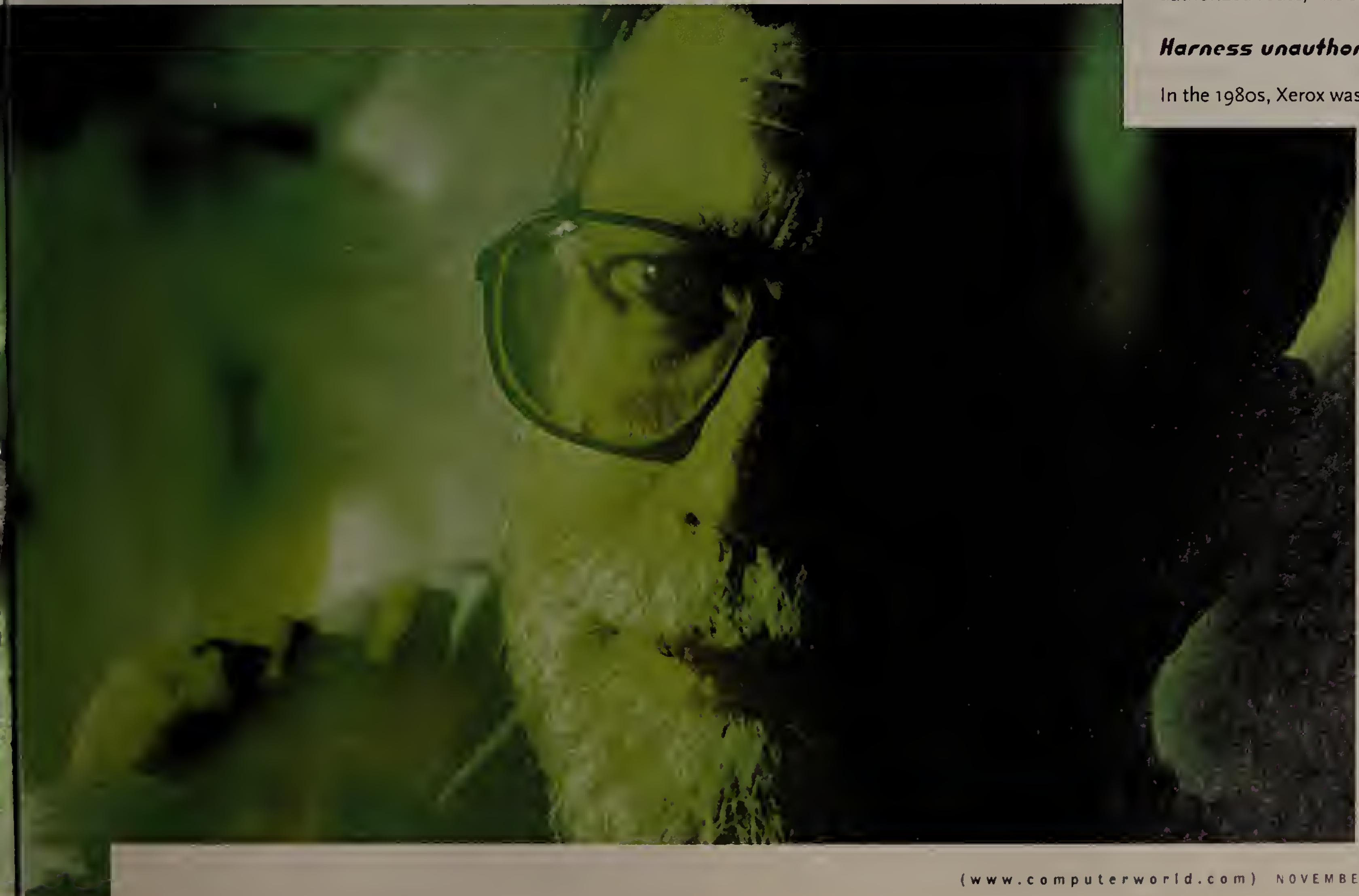

photo by Evan Pilchik

Using the synergy that arises between the various members of PARC's eclectic community, Brown is sketching a future in which the very nature of work will undergo radical transformation — as will traditional notions of IS management, about which Brown is decidedly unenthusiastic.

"Business process re-engineering is backfiring," Brown says. "Attempts to put mission-critical applications on client/server architecture are turning out to be little more than automating the sales force."

This is hardly the fault of technology managers alone. Still, Brown believes CIOs are in a position to initiate the massive organizational changes that must take place in the next five to 10 years for companies to remain competitive.

Ultimately, this means CIOs will need to understand social and technical requirements, as well as "figure out how to make workers effective, rather than simply productive," Brown says.

For starters, Brown points out that corporate life has both authorized and unauthorized aspects. For example, all work that gets done within the boundaries of the classic organizational chart, using any formal processes set up within lines of business or departments, can be classified as authorized. But much of the work in any viable operating business, Brown says, is actually accomplished in unauthorized ways — that is, by employees transcending formal processes and organizational boundaries to collaborate unofficially on solving problems. "Not incidentally, such employees are usually more effective than if they followed the authorized route," he says.

### Harness unauthorized learning

In the 1980s, Xerox was spending millions of dollars on training for its field technical representatives — the employees who repair equipment at customer sites — by bringing them back to headquarters and putting them through formal classes. In an attempt to boost productivity, Brown hired anthropologists to study how these employees actually did their jobs.

It turned out that the real learning took place in the field offices, as reps came in from their assignments and traded war stories around the coffeepot. This "unauthorized" training — which would have been dismissed as dead time in a traditional business re-engineering study — was in fact where real value for Xerox was being created, in terms of disseminating creative solutions to customer problems.

It is in cases like this that collaborative technologies, such as those found on the Internet, the World Wide Web and corporate intranets, hold the most promise, Brown says. Indeed, he sees the competitive landscape of the future absolutely requiring corporations to recognize the importance of unauthorized work. Furthermore, he envisions CIOs in five to 10 years as being instrumental in facilitating the natural exchange of ideas — and the off-the-charts creativity — so essential to a dynamic and successful business.

Companies that do not encourage this type of exchange will be at a serious disadvantage, Brown warns.

"There is something wonderfully ad hoc about the Web that lets you do incredible things on the cheap — and sometimes even on the sly — that promises to deliver very good things," Brown says.

PARC is studying how to make the best use of Internet technologies through internal use of MUDs. Originally called Multi-User Dungeons — the first MUD was an online version of the fantasy game Dungeons and Dragons — these are increasingly referred to as Multi-User Dimensions or Multi-User Dialogues, as they evolve into business communication tools.

A MUD is a virtual space where people can meet electronically, even though they are physically dispersed. Two things distinguish a MUD from a chat area on an online service such as America Online or from a linear E-mail exchange: the interactions between participants are simultaneous and take place in real time; and the work space, although virtual, has characteristics that endure even if current participants leave the so-called space.

Early MUDs consisted primarily of text exchanges between participants. But that is changing to include other mediums. At Xerox, software developers can enter these virtual conference rooms via their networked computers; open video windows that allow them to see and hear others in the room; put documents on a virtual conference table; or scribble on a virtual whiteboard that everyone in the room can view or annotate.

Because these virtual workplaces blur the boundaries between the physical and virtual, and because they are unencumbered by organizational or geographic boundaries, they "allow the workers to create intellectual and practical communities spontaneously that truly support the daily work that must get done," Brown says. This kind of interaction will be necessary, he suggests, if corporations want to encourage and reap the benefits of truly collaborative work in the future.

Brown has written about these so-called "communities of practice" at National Semiconductor Corp., where a group of engineers unofficially began conducting reviews of new chip designs. Word spread throughout the company that this group could provide extraordinarily valuable — albeit unauthorized — advice to other design teams. The net result? The weaving of unauthorized work into existing structures to make a new social fabric supporting quality improvement.

And this never would have happened if employees had stuck to approved processes.

Brown points to one technology in particular that promises to make communities of practice viable. Internet Multicast, also called Mbone, allows continuous simultaneous connections between multiple computers (unlike current Internet/intranet implementations, which provide brief links between two computers at one time). Mbone — invented by PARC researcher Steve Deering while he was a graduate student at Stanford University — will vastly cut the costs of sustaining these multiple connections, making possible real-time audio and videoconferencing between distributed sites.

"This is a huge idea, one that will have tremendous implications for the corporate IT climate 10 years out," Brown says. But here's the challenge associated with all of the technologies mentioned: Can IS, which often has trouble supporting even the most structured business activities, provide the right kind of technological direction to enable these social changes?

According to Brown, only if the CIO seizes more responsibility.

### CIO holds key to future

Brown sees CIOs assuming responsibility for the enterprise information architecture. Putting the right kind of technology infrastructure in place is only the beginning. "Corporate quality efforts, human resource activities and corporate training will all coalesce within the office of an information architect" — or, as Brown likes to call the CIO, "the learning architect."

"With today's accelerated pace of competitive change," Brown says, "a corporation's real edge comes from being able to adapt swiftly to fluctuating market and economic conditions and, therefore, from being the fastest at learning. Technologists are in the best position to take a leadership role here, but, by and large, most IS shops don't realize this yet."

To succeed, a CIO must ask fundamental questions that go beyond technology, power politics and turf wars to discover where true value is being created, Brown says. If the value is being created at the coffeepot, the CIO must make sure the organization not only captures this value, but keeps it percolating.

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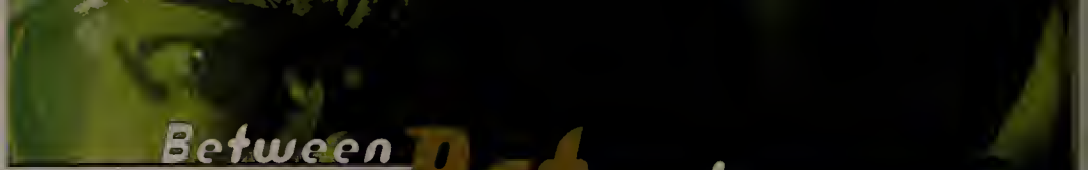
LAPLANTE is a freelance journalist based in Woodside, Calif.



## Between Art and Science:

### Fringe Benefits

If you're trying to invent the technological future, whom do you hire? If you're John Seely Brown, director of Xerox Corp.'s Palo Alto Research Center (PARC), you look toward the fringe. The artistic fringe, that is.

In 1993, Brown established the PARC Artists in Residence (PAIR) program, which offers generous cash stipends to painters, photographers, writers and other artists who compete for a handful of prestigious, 12-month residencies on the PARC campus in California.

Brown's idea is this: Bring in artists who are already pushing the creative and technical boundaries of their disciplines. Act as matchmaker by coupling each artist with a PARC scientific researcher with whom they seem to find creative synergy. Give them the run of the place for a year, then see what happens.

"In many ways, artists are trained to push boundaries, to extend the limits of existing genres," Brown says. How is this relevant to PARC? In a multitude of ways, but specifically when exploring the commercial possibilities of the World Wide Web and the Internet, Brown says.

Basically, the Web represents a new document type. "On the Web, all there are are documents. There's nothing else," Brown says. "So this funny little theme we have of Xerox as the document company plays very well with what's happening in cyberspace."

This is also where artists come in, by helping to rethink traditional definitions of what a document can be. For example, one PAIR project is studying how to turn a video clip into a Web document. It's not as simple as it sounds, Brown insists. PARC isn't interested in simply allowing people to view a video, or even to download it or capture still shots from it. Instead, PARC wants to be able to exploit all the possibilities of emerging Web technologies to create "a new document type altogether," he says.

This might include highlighting the most interesting parts of the video. Or allowing users to manipulate or edit the video. Or developing multiple indexing structures so that viewers can search through the various aspects of the mediums — the images, the soundtrack or the text of the screenplay — and see how they interact. In short, viewing a Web video document would be a completely different experience than playing a video on a VCR.

The PAIR program has been so successful in exploring these types of issues that Brown created a new laboratory in March that extends the concept.

Called the Creative Documents Initiative, it is run by an artist and former director of the PAIR program, Rich Gold. The project has the parallel goal of bringing artists and researchers together, but focuses specifically on creating and managing documents that contain multiple mediums.

– Alice LaPlante

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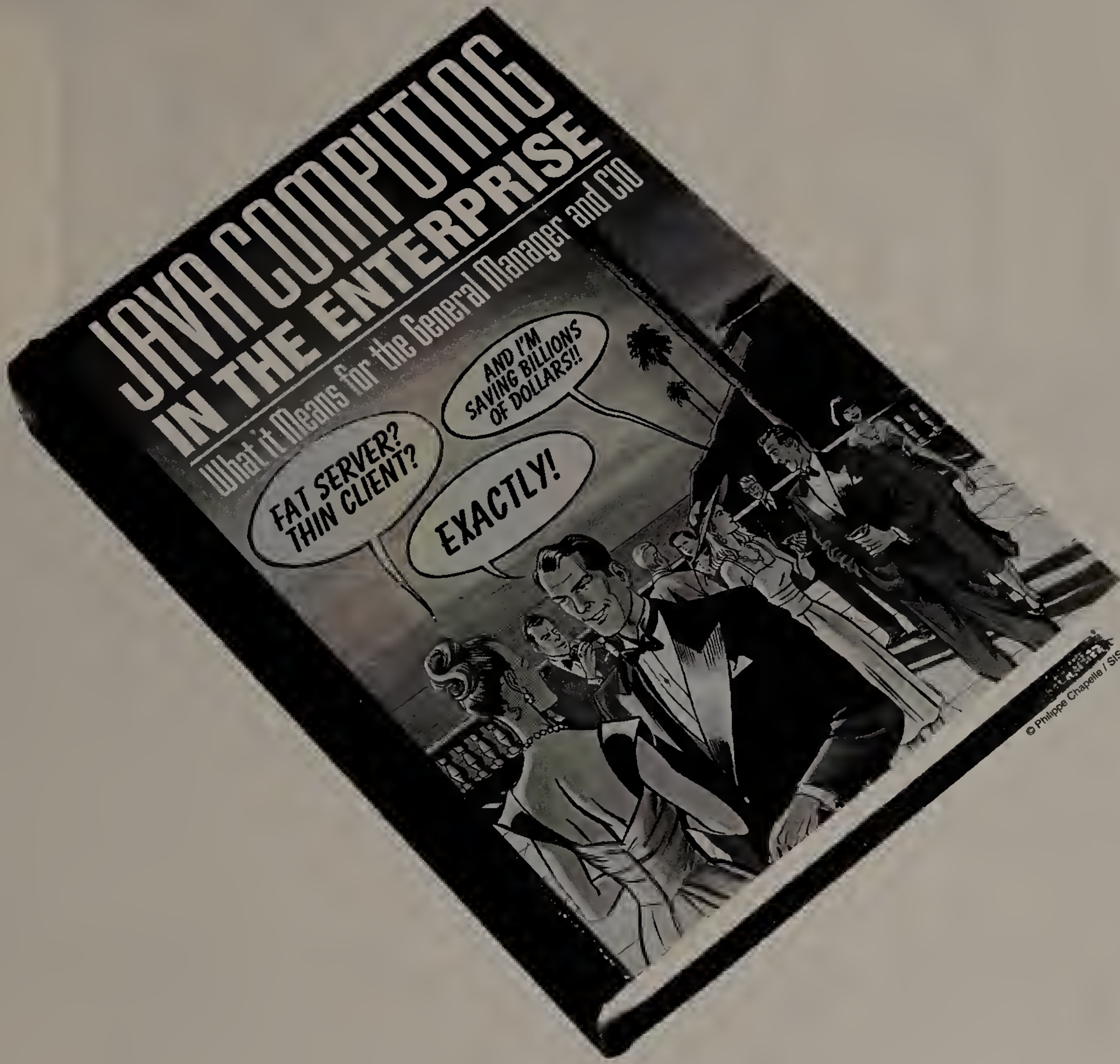
comes along only once in a paradigm."
—*The Java™ Journal*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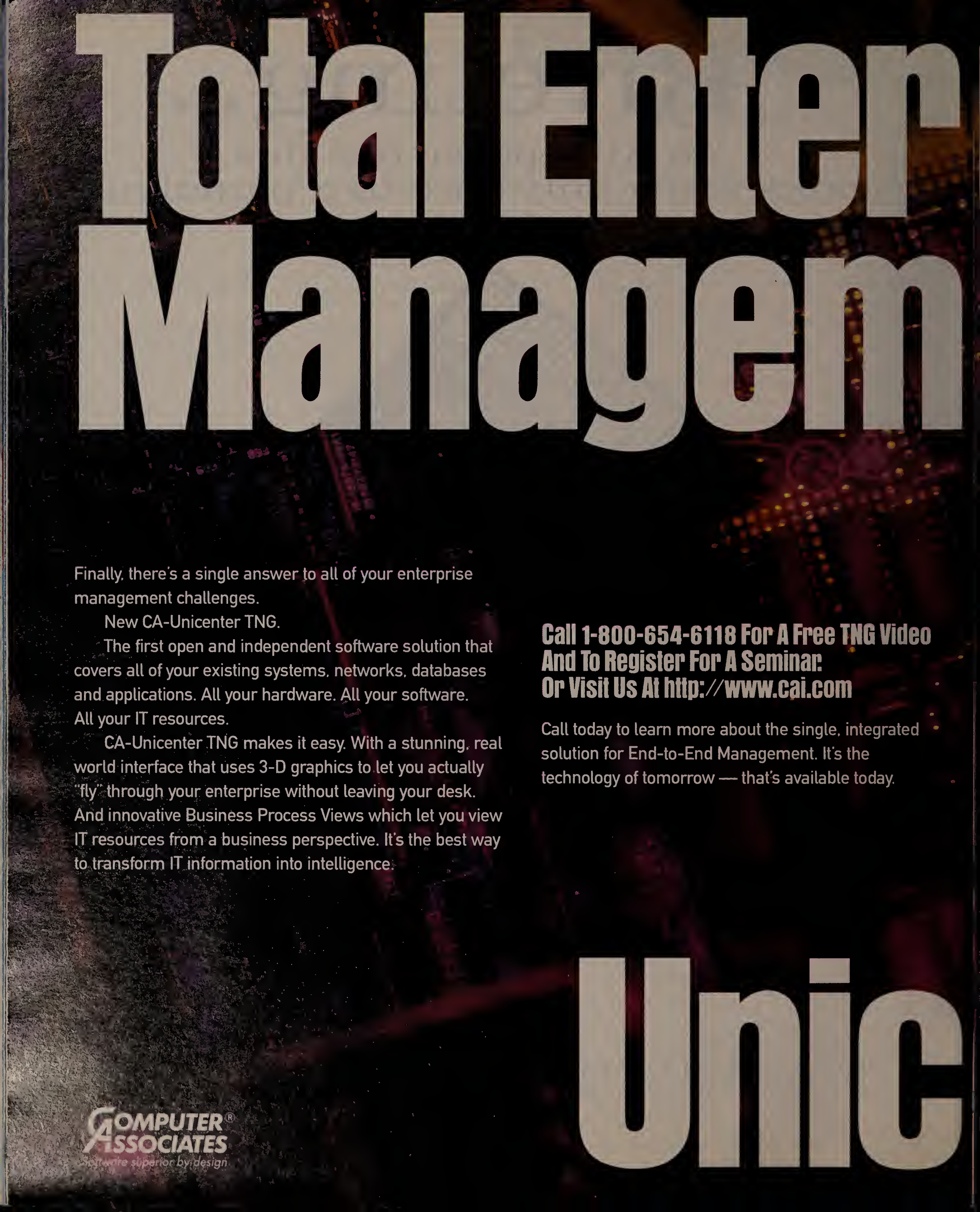

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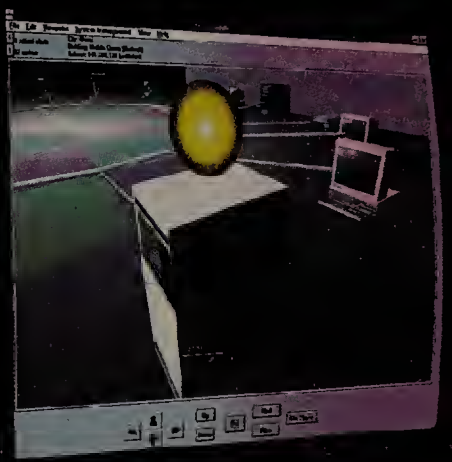

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*Ready for Zazen meditation,*
*poolside computing, work you like*
*and "wetware"?*
*Five twentysomething standouts are.*
*Unfortunately, you probably*
*won't meet them in*
*the halls of corporate IS.*

### by Joseph Maglitta

*Thank God for Netscape, Yahoo and every other company juiced by twentysomethings for reminding Wall Street — and the rest of us — that the technology savvy of Generation Xers extends well beyond Sony Playstations, TV remote controls hunting* Brady Bunch *reruns and computerized cash registers for their crummy slacker jobs at McDonald's.*

*Sit a few minutes on a sunny afternoon with Tait Stevens, Bobby Land, Dykki Settle, Bruce Padmore and Steve Crutchfield, and you're quickly reminded that before Bill Gates, Steve Jobs and Scott McNealy were 40, they were 20.*

Computerworld *recently scoured the country for bright young achievers who are shaping the next generation of computing. They may or may not follow in famous footsteps, but they've already had an impact. (See bios, facing page.) These newcomers are smart, articulate, philosophical and idealistic, but pragmatic. They care about the poor, the disabled, the uneducated and other technology have-nots, but believe in free markets. None is older than 24. Here are highlights from a recent videoconference in which we asked the group to talk about the future of work and technology.*

**Q:** In the future, do you think corporate IT will be able to attract young people like yourselves?

**DYKKI:** The world of the corporate IS department is a maintainer culture, where people are more concerned with 99.99% stability and sticking with what works. My culture is an innovator culture, where 80% stability is good enough, and there is always a new problem around the corner. I see many innovators who have trapped themselves in maintainer cultures, and vice versa, and they are invariably unhappy. No way would I be foolish enough to put myself where I could do more harm than good and be unhappy to boot.

**BOBBY:** It would depend on the corporation. I'd like to be on the cutting edge of the Internet, working with new hardware. I really don't want to be stuck behind a desk with few options to explore.

**TAIT:** If the focal point of my job were prototyping or implementing new technology, yes. If it were simply maintaining off-the-shelf stuff, I'd just be working for money.

**STEVE:** I'd rather be the guy that designs the car than the mechanic.

**BRUCE:** I'd run screaming.

## PARENTS' WORK ATTITUDES

**Q:** How does your attitude toward work in general contrast, say, with your parents' attitudes?

**BOBBY:** My parents saw work as a 9-to-5 deal. I see work that is stored on a disk and finished at night in the den or at the side of the pool watching the kids on the weekend. I don't like the way my parents view technology as something difficult.

**TAIT:** They seem to like [their jobs] OK, but they are on a time clock and production oriented. Their jobs are not outgrowths of their hobbies. I like an environment where deadlines are set because they are *actual* deadlines, not because they want to see what you are going to get done. I need a boss who can cope with the idea that 9-to-5 might not be my most productive hours.

**BRUCE:** In the past, work followed a defined routine to complete a familiar task on a daily basis. In the future, more work will involve developing solutions to new or changing needs which are completely unfamiliar.

**DYKKI:** If your job forces you to distinguish clearly between work and non-work, then you are doing the wrong kind of work.

## TECH KEEPERS

**Q:** Within that future work environment, which technologies look promising?

**TAIT:** Intelligent agents. Intelligent agents. Intelligent agents. Intranets are going to take off incredibly. Net computers, I think, are going to happen. But not just for [getting to] the Internet. What if users could bring in their own modules to upgrade the net computer for the day? Beginning users could use the standard "VW Bug" configuration, but experts could bring in their upgraded modules and use the "Ferrari."

**"Our children will see new methods of understanding and manipulating biological systems...**

# Ever had to debug a cow?"

photos by Craig MacCormack

**BRUCE:** Personalization tools that gather information about the user and edit — or filter — data that is sent to the user. Also, automatic response technology, which allows analysis and classification of free-form incoming information and determines the correct action to take based on that information.

**BOBBY:** Voice recognition.

**DYKKI:** Our children will see new methods of understanding and manipulating biological systems. This biotech, or "wetware," will be an entirely new world of interfacing technology and life, bringing its own opportunities and problems. Ever had to debug a cow? Tools operating on the atomic and subatomic levels [will] allow the development of computers, machines and matter manipulation at submicroscopic levels.

**STEVE:** I see computers headed for the same fate as those tiny motors we have all over our homes and offices — in fans, hairdryers and CD players. We don't think of them as motors; we think of them according to their function. That's what people really want from technology — little things that they can interact with directly to organize their appointments, sort out their finances, ideally linked by some sort of network. Special-purpose solutions, not monolithic $5,000 behemoths that do everything.

## SILICON BUGGY WHIPS

**Q: Which technologies are destined to become buggy whips over the next five to 10 years?**

**DYKKI:** Gopher. NetWare and Lotus Notes. CD-ROM is doomed, as well as silicon chips.

**BOBBY:** Anything that exists now can be integrated into a new environment.

**Q: In this room are five males, four of them white. We looked hard. So where are the standout women and other minorities?**

**STEVE:** A very good friend of mine, a woman majoring in computer science, has told me that at times she's heard things amounting to "it's a man's field" from peers and even professors. The only real solutions are long-term solutions, and I think it all gets down to elementary [school] education.

**BOBBY:** There is no female Bill Gates. We need a woman saying, "Look at me. I did it, and so can you."

**BRUCE:** Without an abundance of female and minority role models as technologists, there is still a sense of futility to overcome. When I was growing up in New Orleans, a lot of people didn't see how technology applied to their lives. They were really surprised when I showed them. My mother sacrificed and gave me whatever books, software and electronic devices I wanted — no questions asked. I found my ideas and solutions were just as good, if not better, than my peers'. I said, "I can play this game." But I'm a mutant.

**TAIT:** Just wait.

**Q: Are we destined to become a society of technology haves and have-nots?**

**BRUCE:** My mother told me when I was young: "If you have money, you can make money." At first I did not understand that odd remark, but as I grew up, it made itself bitterly clear. I had no resources to go to. I had to teach myself. My company's parent company, Information Cybernetics, is working to gain federal funding to provide both Internet access and hardware for public housing projects nationwide. We believe that universal access is the key.

**TAIT:** Improvement of our educational system will help allow the have-nots to become haves. It's very poor thinking to say, "if we put computers in schools, that is going to solve all the problems."

**BOBBY:** As time passes, prices will go down, allowing more people to buy the computer or get the Internet connection. Competition is the key to the have and have-not situation.

**STEVE:** Think of television when it first came on the scene 50 years ago. All the neighbors would crowd around the only set on the block. Today, you see TVs at restaurants and gas stations, and many people have several at home. So as a technology matures and its price falls, availability increases and, perhaps more importantly, awareness of the technology and how to use it increases. Twenty years ago you had to be able to program to use a computer. With today's graphical user interfaces, you don't even have to type.

**DYKKI:** I see clear deterioration of the middle class over the next couple of decades. What can be done? I don't know yet. ... I am experimenting with community "information brokers," enabling the rural and low-income *community* rather than the individual. I think that may well be a first step.

Many times, I have felt that it is white, liberal, digerati ignorance, egocentrism and foolishness to believe that this is something that other cultures even *want*. But then I forget about such nonsense and keep butting my head against the wall.

## TAKE OFF BLINDERS

**Q: Complete this sentence: The technology of tomorrow could be improved by incorporating more influence from ...**

**DYKKI:** Alternative cultural reality constructs. Zazen meditation, aikido-based flow dynamics, aboriginal dreamtime, Navaho neurolinguistic programming, etc. We have been terribly egocentric in our Western European, Protestant, work-ethic technology philosophy. A little peppering of alternative cultural paradigms would significantly advance the global community and the human condition.

**STEVE:** People outside the technology industry. People in the industry become very self-satisfied and complacent. So many of these companies think they are changing the world and creating revolutionary new products, but when these products hit the market, they just don't fit people's needs.

What we need to do, both in academics and in industry, is to think about what kind of technology would help the vast majority of people out there who know nothing about computers — the thinkers, artists, craftsmen, poets. It's obvious that the greatest potential for the industry to expand lies among that vast majority of people who don't actively use computers. They're where the future is.

**DYKKI SETTLE**, 24. Vice president, Ventana Technology, Carrboro, N. C. First graduate in reality engineering from University of North Carolina. Key role in developing first public World Wide Web server and HTML standard. In 1994, co-founded DreamTech Enterprises with wife, Shannon. DreamTech produced the first trade publication on the Web — *Umney's Last Case* by Stephen King. Settle's teams have been creating new Internet and multimedia technologies.

**TAIT STEVENS**, 22. This Fall started MD/Ph. D. fellowship in medicine and medical information technologies at Loma Linda University in Riverside, Calif. Developed custom software and systems for Riverside General Hospital, University of California, Riverside, March of Dimes, Medical Office Services, Inc. Produced technical illustrations for *International Journal of Bifurcation and Chaos*. Currently working on transmitting real-time patient information over TCP/IP. Also developing a nonprofit Internet telecommunications firm.

**STEVE CRUTCHFIELD**, 19. Junior at Johns Hopkins University in Baltimore, majoring in electrical/computer engineering and computer science. Original software includes Zoom Lens for the visually impaired and Beam Wars, a shareware arcade game. Teaches grad students programming. Finished his second internship at Apple Computer, Inc. this summer.

**BOBBY LAND**, 19. Biology and computer science double-major at Marist College, Poughkeepsie, N. Y. Webmaster for school's World Wide Web academic site, developed two French and Russian sites. Also developing school's first electronic admissions application. His prototype electronic athletic hall of fame is expected to be funded soon by a major corporation.

**BRUCE PADMORE**, 24. Director of information technology at Cambridge, Mass.-based Millennium Productions, Inc., a firm merging art and technology. Bachelor's degree in mechanical engineering from Massachusetts Institute of Technology. Worked at IBM's Thomas J. Watson Research Center in New York. Left after realizing he was allowing "technical pursuits to define his thinking" rather than vice versa. Invented Braille mouse.

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MAGLITTA is senior editor, corporate strategies, at *Computerworld*. Special thanks to PictureTel Corp., Danvers, Mass., which handled the logistics, technical work, and provided the venues and connections for our four-site videoconference roundtable.

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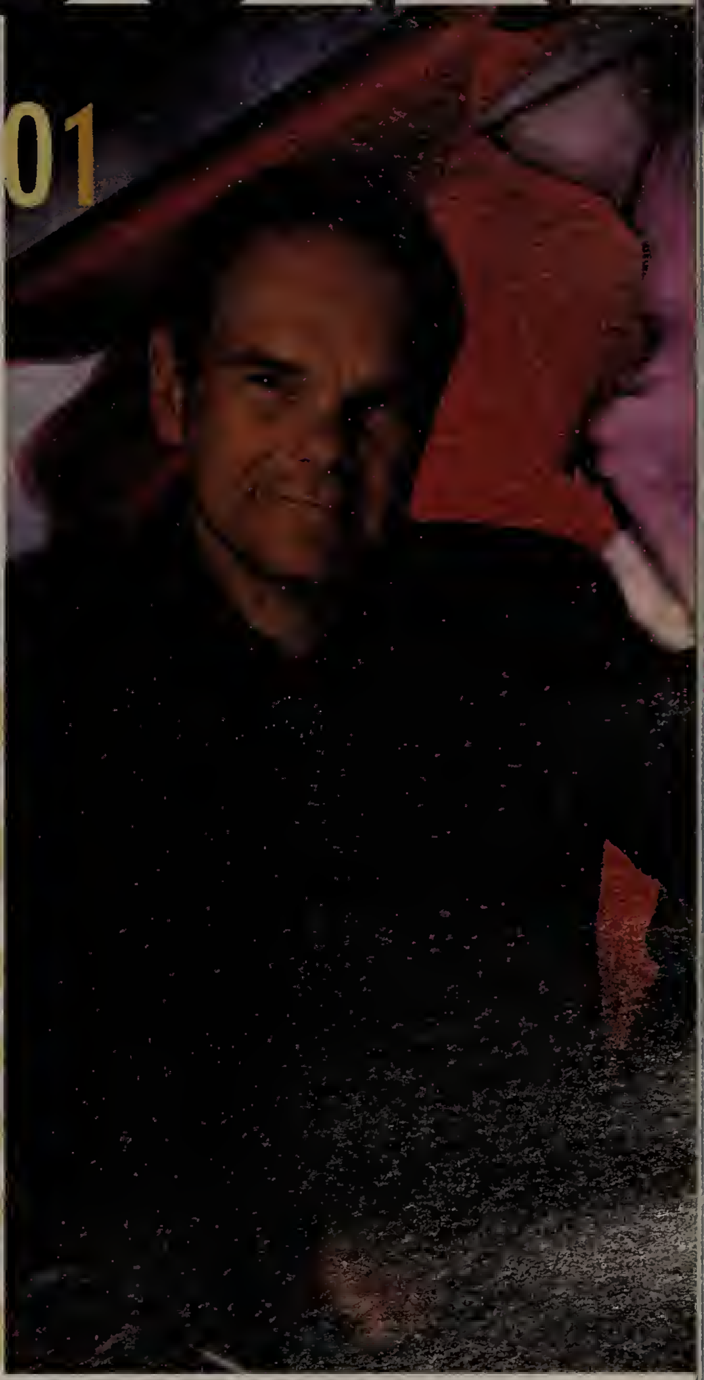
# don TAPSCOTT

## economics 0001 0000 0001

by Brian S. McWilliams

photos by Eduard Gajdel

A SCORE OF TOP-FLIGHT IT VENDORS AND LARGE-SCALE USERS HAVE HIRED DON TAPSCOTT TO HEAD UP THE ALLIANCE FOR CONVERGING TECHNOLOGY, A MULTIMILLION-DOLLAR STUDY OF HOW COMPANIES CAN TRANSITION TO THE DIGITAL ECONOMY. WHY NOT? HE WROTE THE BOOK ON IT, WHICH FOLLOWED ANOTHER BEST-SELLER, *PARADIGM SHIFT*. TO TAPSCOTT — CONSULTANT, AUTHOR AND THE MOST SOUGHT-AFTER IT SPEAKER ON THE RUBBER CHICKEN CIRCUIT TODAY — DIGITAL NETWORKS LINKING NOT MACHINES BUT HUMAN INTELLIGENCE WILL HAVE A MORE PROFOUND EFFECT ON HUMANKIND THAN DID THE PRINTING PRESS. HYPERBOLE? READ ON.



Fifty minutes into his recitation on how the Internet in the foreseeable future will transform computing and business, Don Tapscott hits a serious downdraft. Held aloft by talk of convergence and networked intelligence, it's as though he's been riding a thermal above this century-old, three-story brick building where his consulting company, New Paradigm Learning Corp., has its offices in a restored section of downtown Toronto.

Pressed on how this emerging digital economy will affect children, suddenly, the man anointed "the world's leading cyber-guru" by no less than U.S. Vice President Al Gore plummets swiftly earthward.

"I know the 'net will make the world smaller for them," he says softly, speaking of his son, 9, and daughter, 13. Both, like their dad, are avid users of the Internet and online services. "But I'm not sure if it will make the world any better."

Tapscott can turn on the hyperbole as well as any author of best-selling business books. But it's this groundedness, this ability to describe both the Internet's opportunities and hazards in a way that has both economic and personal urgency, that differentiates him as a visionary from many Cassandras of computing. It's also what's made Tapscott a trusted counsel to corporate information executives and other business and government leaders.

Hewlett-Packard Co., MCI Communications Corp. and Xerox Corp. have hired him to head up The Alliance for Converging Technology, a multimillion-dollar study of how companies can transition to the digital economy.

Tapscott predicts that by the year 2025, half the human population — more than 4 billion people — will be on the Internet, compared with today's 30 million users. That's not all. He expects the 'net to surpass all previous revolutions in human communication — the printing press, telephone, television, even the computer — in its impact on our economic and social life.

*The future will be kind to CIOs who understand the digital economy. But woe to those who do not, warns Don Tapscott.*

Even if you don't buy that scenario, it's difficult to disagree with his claim that the 'net has the potential to destroy old businesses nearly as quickly as it is creating new ones. "We are on the verge of a fundamental change in the nature and role of information technology," he says. "Finally, IT is coming into the heart of the enterprise. It will no longer simply be about avoiding costs. It will become the means by which individuals and enterprises create wealth."

For corporate IS organizations, the implications of the new digital economy are clear, Tapscott says. Don't stop at aligning IT with business strategy; look for ways that IT can *shape* strategy. In this age of networked intelligence, IT will move front and center in a range of industries, from publishing and entertainment to health care.

Tapscott's favorite case study of the promise and peril of this new business model is Encyclopaedia Britannica, Inc. The best-selling encyclopedia for more than 200 years, Britannica suddenly slipped to No. 3 in 1994, as parents eschewed the 20-volume book set for the CD-ROM-based encyclopedias from Microsoft Corp. and Grolier Electronic Publishing that come bundled with many home PCs.

Concluding that it couldn't compete in the low-margin CD-ROM market, the company adroitly created Britannica Online on the Web and began licensing the service to universities rather than selling strictly to families. "In the process of transforming itself into an internetworked business," Tapscott says, "Britannica had to change no less than its product, distribution channels and customers. The only other choice was to become toast."

The future need not be perilous for companies that can adapt quickly and become "internetworked" — that is, use interactive multimedia and the Internet to transform how they produce and market products and services, as well as transforming the structure and goals of the enterprise. The first step is to recognize that, in the future, the physical flow of information, such as checks, bills of lading and face-to-face meetings, will be supplanted by digital information flow.

"Business models, not just business processes, must be transformed for the digital economy. The future will be kind to CIOs who understand the enabling effect of this new medium," he says.

But don't confuse this shift with the unfulfilled promise of the paperless office from technologies such as imaging, Tapscott says. "The effect of digitization goes beyond just speeding up communication. It will enable whole new ways of human collaboration," he says, pointing to the "paperless" design process the Boeing Co. adopted for its Model 777 aircraft as an example.

Far-flung, cross-functional teams designed and debugged the new aircraft, relying on networked workstations running 3-D computer-aided design and finite element analysis software. Among the benefits: The plane they created needed about 90% less scrap and rework than previous ones designed with paper-based methods, translating into significant cost savings and quicker time to market.

Just as physical communication will give way to digital forms, a company's physical assets will be less important than its intellectual riches in the future, according to Tapscott. "You don't look at a company like Netscape Communications Corp. and ask how many buildings they own, or what their cost of labor is, or even how much capital they have. Brain, not brawn, will enable companies to thrive in the new economy." He predicts the digital economy will level the playing field somewhat to allow smaller companies to make bigger, faster gains.

### *A high-stakes game*

For most organizations, the impact of the digital economy will be felt more slowly than in the rapidly converging publishing, telecommunications and computing industries. Still, Tapscott believes the Internet stakes are too high for firms to justify a wait-and-see attitude toward developing at least a presence on the World Wide Web. Laggards, he says, should take no comfort in recent predictions by Framingham, Mass.-based market research firm International Data Corp. that many Fortune 500 home pages will close this year, resulting in ghost sites.

**"In the process of transforming itself into an internetworked business, Britannica had to change no less than its product, distribution channels and customers.**
***The only other choice was to become***
***toast."***

"The only thing that's going to die," Tapscott hisses, "is the first generation of 'brochureware' applications. But they will be replaced by a second generation, like Britannica's, that fundamentally changes the business model."

Over the next 10 years, in Tapscott's view, information executives will be measured by their contribution to IT-intensive business initiatives — such as innovative, money-making Web applications — not by how well they enable their organizations to avoid costs. Enlightened companies will call on them to answer questions such as, "Given this technology shift, what products and services should we be creating for our customers?"

Besides bringing networked business opportunities to the table, IS executives increasingly will own the "important but dangerous" job of integrators and guardians of the corporate internetwork, he says. Slowing them down is what Tapscott calls "The Barbecue Law of the Internet: It ought to come with a sticker that says, 'Assembly required. Some parts not included.' " Even more than the paradigm shift to client/server, this rise of internetworking will require CIOs to learn a whole new set of technical skills, from Sun Microsystems, Inc.'s Java programming language and other virtual machine technologies to methods for implementing secure transactions over public networks. They must also manage an even larger and aggravatingly amorphous set of vendors.

Tapscott predicts the 'net will cause a shakeout of general-purpose hardware companies and encourage the rise of small, special-function hardware and software firms, as multimedia creates new product and service categories such as hybrid TV/computers, sensor systems and network-based entertainment and education.

Working in favor of network architects is the ratification of TCP/IP as computing's lingua franca. "Open systems are dead. Long live open systems," says Tapscott, who believes the main goals of open systems — interoperability and portability — will be achieved before the end of the decade. "As the saying goes, on the 'net, nobody knows you are a dog ... or a Mac or an OS/2 workstation or anything else," he says.

With plug-and-play networking and convergence will come the rise of what Tapscott calls "exonets." The flip side of the current craze surrounding intranets, which use HTTP and other protocols for internal applications, exonets will let companies tap into the publicly available network infrastructure. He compares it to the shift at the turn of the century when companies stopped generating their own electricity and bought it from public utilities. "We'll be able to shut down a lot of what we've been doing internally and exploit a public infrastructure.

"Say you need to do electronic data interchange with another company. Instead of hooking your company's network with your partner's and writing your own EDI system, the application will be available on the Internet from a third party like MCI Telecommunications Corp. or Ameritech Corp. — or even Walt Disney Co."

Though Tapscott predicts companies that cling to old business models will be history, his vision of computing's future is ultimately optimistic. The old hierarchical, centralized, one-way model of computing and communication is giving way to a new interactive and decentralized mode. "We're not just talking about an age of smart machines," he says, "but of people becoming smarter collectively through networking."

### *The future's dark side*

Yet Tapscott is no Pollyanna. He concedes that the transition to a digital economy won't come without violent shifts in work and society. Employees will need to be retrained for the new world, just as they were in the shift from an agricultural to an industrial society. "When people get laid off in the foundry in Nashville," he says, "they can't just walk into a job at the Northern Telecom plant. They'll need a community college degree first. I'm not sure we've thought through these things."

Tapscott also worries that Internet use, limited by economic and technical barriers, may be far less than universal. The result, he says, will be "increased bipolarization of wealth, segregation of people into 'net haves and have-nots, and the creation of gated communities in cyberspace."

So the question remains: Will this new digital world be better, or just smaller? Tapscott defers, saying the future is to be achieved, not predicted.

"There's no technological imperative, nothing inherent in the technology that will ensure we realize the opportunities or the dark side. It's people that design systems of privacy, governance and work," he says. Tapscott challenges IT managers to bring their sense of social responsibility and values — as well as their technical know-how — to bear in shaping the digital future.

"That," he says, "is the only way we can ensure this era of networked intelligence will be an age of promise fulfilled and peril unrequited."

---

**McWILLIAMS** is a freelance journalist based in Durham, N.H.

To: Stephen Buckner,
Network Administrator
From: Cheyenne ARCserve

Backup of Lotus Notes
Server successful.
Four open databases
backed up.

To: Jean Arbelle, User
From: Cheyenne InocuLAN

The message attachment
was infected by the
WinWord.Concept macro
virus. It has been cured.

To: Alex Hin,
Network Administrator
From: Cheyenne InocuLAN

Virus scan of
Microsoft Exchange
Server successful.
Eight viruses detected
and cured.

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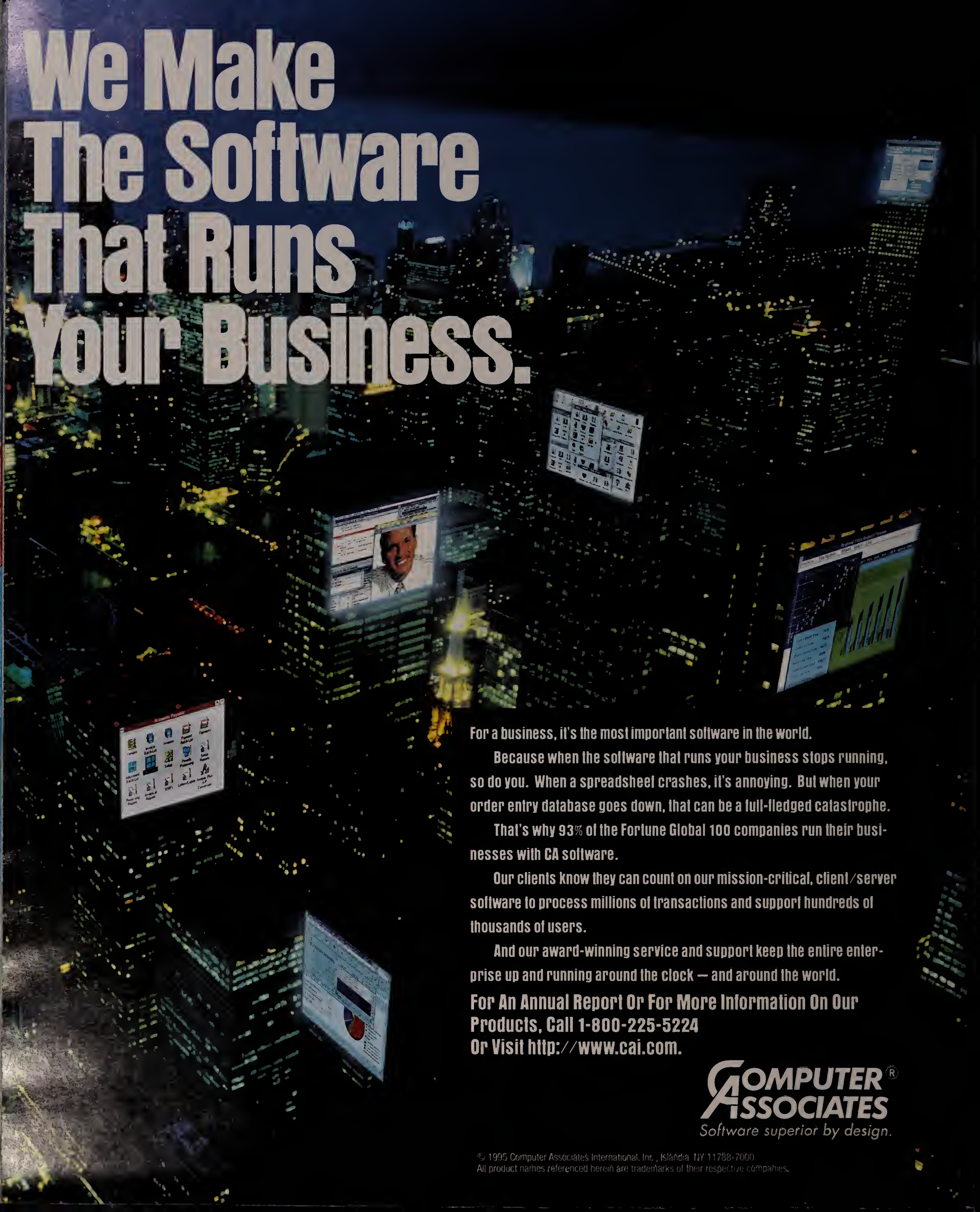

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# Cisco eyes remote market

## Vendor announces servers to help branch office users link to net

By Bob Wallace

In what will likely be a brief pause between acquisitions, Cisco Systems, Inc. recently unveiled a series of branch office and remote access products.

This latest product salvo lets Cisco shops better support remote sites and telecommuters for less money.

But users won't lose key features that cut wide-area networking costs and flexibility, which are often found only in high-end products, observers said.

**Cisco's latest remote networking products**

**Midrange remote access servers base price: $2,900**

| Model | Ports supported |
|---|---|
| 3620 | 1 Ethernet and 1 PRI; or 1 Ethernet and 4 BRI |
| 3640 | Up to 6 PRI or 24 BRIs |

**Remote access routers base price: $1,495**

| Model | Features |
|---|---|
| 1601 | Built-in serial port |
| 1602 | Built-in access device |
| 1603 | BRI port |
| 1604 | BRI port and built-in termination device |

### Double duty

The key product is the Cisco 3600, a series of remote access servers that will let remote users connect to the network using Integrated Services Digital Network (ISDN) or analog links. It also includes firewall security features.

"It's an incredibly robust piece of hardware that's doing double duty for us," said John O'Brien, a network analyst at Mpath Interactive, an Internet game supplier.

"It's serving as both a router and our main gateway to the Internet. And we're completely pleased with its performance," O'Brien explained.

Analysts said Cisco is beginning to recognize the importance of the remote access market.

"They're taking [dial-up] and ISDN [equipment] markets and delivering products with features and flexibility that users need," said Kitty Weldon, an analyst at The Yankee Group, a consulting and research firm in Boston.

The ability to support ISDN and analog links is important because the bulk of remote users still use analog dial-up lines, and many products on the market support only ISDN or analog connections, Weldon said.

The 3600 servers can be equipped with mixed-media modules that support one or two LAN connections and two WAN links. These modules conserve the number of available slots in the server by supporting two functions on one card. Also available are separate cards that support ISDN Basic Rate Interface (BRI), Primary Rate Interface (PRI), and asynchronous links and synchronous links.

On the lower end, Cisco debuted the Cisco 1600 series of access routers, each of which has one Ethernet port, one built-in WAN port and a slot for a card that supports ISDN BRI, T1 and synchronous links.

The 1600s and the 3600s use the same interface cards, so IS managers can stock one set of interface cards instead of two.

But these cards can't be used in Cisco's higher-end access products.

### 'net component

Unlike competing products, the 1600 series also supports IP address conservation features, encryption and compression.

For example, each 1600 uses a single IP address and includes an IPX-to-IP gateway that would allow multiple Novell, Inc. NetWare LAN users to access the Internet without having to buy IP software for each station.

Cisco rounded out its product launch with NetBeyond, an integrated package of interchangeable internetworking products designed to take on 3Com's OfficeConnect system, which was announced earlier this year.

NetBeyond can comprise the 3600 series, 1600 series, a recently announced Fast Ethernet hub and two different Ethernet switches.

Token Ring additions are due in the future. OfficeConnect currently has Token Ring components.

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# Server tune-up aids NT, NetWare performance

CONTINUED FROM PAGE 65

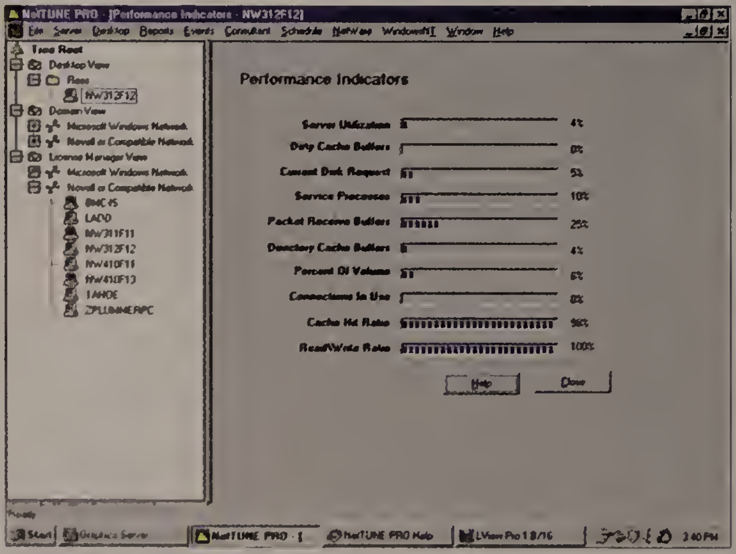
when a test server crashes and automating responses," Engle said.

Other enhancements include a faster and easier interface for tracking lots of servers, he said.

NetTune Pro 3.0 is a good first step beyond NetWare, but the software needs to better differentiate between Windows NT workstations and servers, Engle said. BMC has a fix under way, he said.

The automation and the ability to manage a mix of NetWare and Windows NT servers appeal to David Bowman, director of midrange systems engineering at Ameritech Corp. in Chicago.

"We're doing piecemeal management of our NetWare and Windows NT servers right now but want more sophistication," Bowman said. Lots of tools can "discover what's going on, but we need to automate functions that now are administrator-dependent," he said.



**Server Tuner** *from the new NetTune Pro console lets managers monitor and reconfigure both NetWare and Windows NT servers to improve performance*

With a staff of only four to support more than 1,000 users, Astoria Federal Savings Bank in Lake Success, N.Y., needed NetTune Pro to automate management of its NetWare servers, said Joe Sciortino, LAN services group manager at the bank.

"We get a quick graphical view of how each server is working, warnings of poorly set parameters and trend analysis," Sciortino said. The tool can automatically tune servers by evaluating trends, he said.

NetTune Pro is available now. Pricing starts at $895.

BMC also offers Opertune, software for tuning Unix servers.

Pricing for Opertune starts at $1,875.

---

# IntranetWare

CONTINUED FROM PAGE 65

istrator at Kaiser Permanente Health Plan, Inc. in Atlanta, agreed. "We're in wait-and-see mode regarding IntranetWare. Novell has to prove to us they can execute a strategy and deliver all the necessary components before my bosses will sign off on it," he said.

Such sentiments are typical, said Ron Milione, chief of technology at Systron, Inc., a systems integrator in New York.

"IntranetWare is a good product, and it works. But users haven't been banging on our door to get information about IntranetWare, let alone buy it," Milione said.

Jamie Lewis, president of The Burton Group, Inc., a consultancy in Salt Lake City, said IntranetWare offers users the advantage of NetWare's Novell Directory Services and integration with Novell's GroupWise groupware and ManageWise LAN management applications. But Microsoft's BackOffice suite also has these capabilities, Lewis said, with its Exchange and SMS Server.

**Systron's Ron Milione:** *Users haven't been banging down the door for IntranetWare*

And IntranetWare lags behind Microsoft's BackOffice and Netscape's SuiteSpot offerings in other key areas, Lewis said.

IntranetWare, he said, won't have a proxy server or support for native TCP/IP until the middle of next year.

Despite the current dearth of some key features, Novell has something Microsoft and Netscape don't have: a huge installed base. And users such as Wilkerson said that counts for a lot. "Anytime IS can stick with what it has and avoid a painful migration, it will," Wilkerson said.

## Anticipating Internet Explorer 4.0

Novell's minimalist marketing tactics aside, analysts said IntranetWare has some serious catching up to do. They predict things will get even tougher for IntranetWare once Microsoft ships Internet Explorer 4.0 in the first quarter next year.

Internet Explorer 4.0 will have direct integration with the Office 97 suite of applications. This will let users deploy the Explorer engine to do Web browsing from within Office applications.

Microsoft's next client upgrade for the Exchange messaging package is due in January. It will include Outlook, client software that will let users establish Internet and intranet connections from within Exchange. "IntranetWare doesn't have anything like that," said Ron Milione, an expert user and chief of technology at Systron. — *Laura DiDio*

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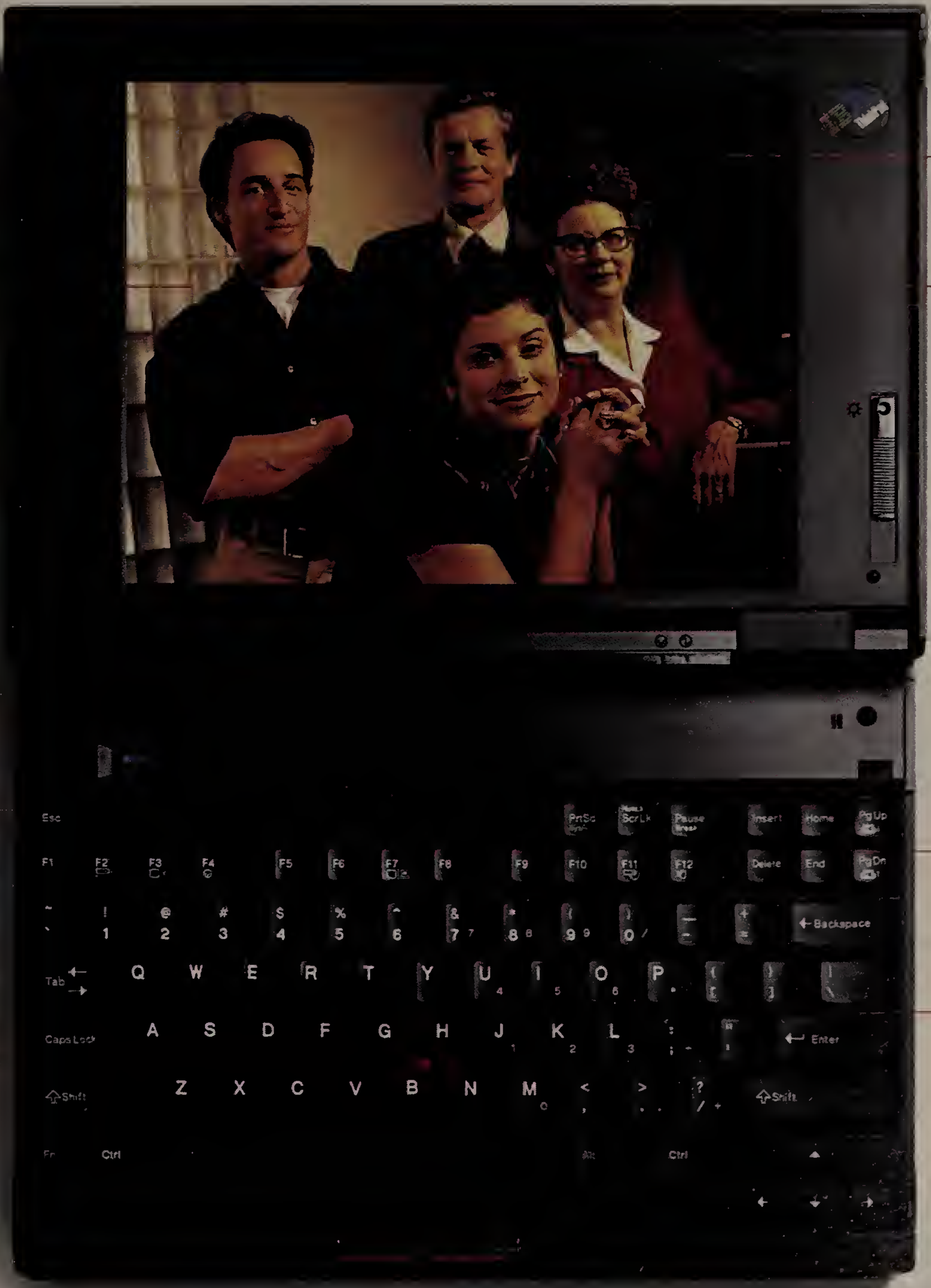

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# Name that intranet

By Kim S. Nash

Are you weird if you name your intranet?

Although we don't usually give names to most technological entities, intranets are a different story. Information systems groups and end users often do name their intranet applications.

Eli Lilly & Co., for example, has ELVIS — the Eli Lilly Virtual Information Server. Life.com, Inc. has Elias, Owens-Corning Fiberglas Corp. has Fiber-Space, and the list goes on.

Is this weird? That depends on whom you ask.

What determines whether we name technology or not is "the degree to which the technology helps us realize our goals," said Alan Hedge, a professor of design and environmental analysis at Cornell University in Ithaca, N.Y.

For example, boats and cars are often named, but TVs aren't. TVs don't help us get anywhere or do anything.

"I don't know how unhealthy this is," Hedge said. "However, it's probably easier for the MIS folks to swear at a humanized piece of software, so it may be quite cathartic."

**First love**

Intranets are "my major concern, my specialty and my passion," said intranet consultant Scott Marlin.

Extreme enthusiasm for one's job is also a factor.

Before naming Editions Hatier Publishing's intranet, Scott Marlin, formerly the chief quality engineer at the Paris publisher and now an independent consultant, thought hard about what the application meant in the larger scheme of corporate life.

There could be no other name but Oasis. "It's a haven from traditional computing — a place where everyone is welcome, everyone communicates and everyone finds what they need," Marlin said.

Intranets are "my major concern, my specialty and

Names, *page 74*

**Dr. Web's baby names**

The jury is still out on whether it is emotionally healthy to personify technology, but here is a sampling of names users have bestowed upon their beloved intranets

| COMPANY | INTRANET NAME |
|---|---|
| C.C. Pace Systems | STIK |
| Editions Hatier Publishing | Oasis |
| Eli Lilly | ELVIS |
| Life.com | Elias |
| Nampak Group | Net-Zoo |

# In(tra)security

## As intranets proliferate, technical and nontechnical gaps in security appear

By Bob Wallace

Imagine the horror of stumbling upon an employee obliviously using an organization's sole World Wide Web server — which anchors an intranet used by about 10,000 employees — to develop programs, *without worrying whether they would crash the machine.*

So much for intranet security.

That sight recently greeted an information systems manager at a major government institution during a random visit to its prize possession — the intranet Web server.

It underscores why IS managers need to take intranet security seriously as they rush to build intranets to improve the way they do business, said Tom Plaster, an analyst at Strategic Networks Consulting, Inc., an intranet consultancy in Rockland, Mass. "Security should be a top concern," he said.

Many users do take security seriously, but they either are overwhelmed by the breadth of the issue or believe that determined hackers can scale even the highest firewall.

**Strategies for securing your intranet**

- Develop a computer-usage policy for all employees
- Opt for a router-based firewall
- Use a router as a stand-alone firewall
- Use a stand-alone firewall for connection policy and/or address conversion
- Use a firewall with a network monitoring package
- Hire security specialists or hackers to perform a security audit

"Intranets are essentially wide open right now," said Tom Peterson, a staff engineer at Lockheed Martin Idaho Technologies in Idaho Springs, Idaho. "Java scripts are Trojan horses. Users just don't know enough about all potential problems." The company is looking at setting up access lists to restrict who can use its intranet and encryption to help secure key information.

Rick Zipes took a different approach to intranet security concerns.

"We hired a legitimate hacker to do a security audit of our network," said Zipes, director of communications and computing services at telecommunications equipment vendor Mitel Corp. in Kanata, Ontario. "We identified several holes, but the bottom line is that if any hacker has enough time and money, they can do what they want."

To worsen matters, confusion reigns supreme among users when it comes to using firewalls for securing intranets.

Before users go shopping, they

Firewalls, *page 74*

# 'net-based report delivery catches on

By Craig Stedman

The Internet is pushing makers of client-based query and reporting tools to lose some of their desktop religion.

They don't have much choice. Information systems managers are licking their chops at the prospect of using intranets as a low-cost and easy-to-manage way of getting reports to remote users. As a result, desktop tools vendors are biting their lips and embracing a more server-oriented approach.

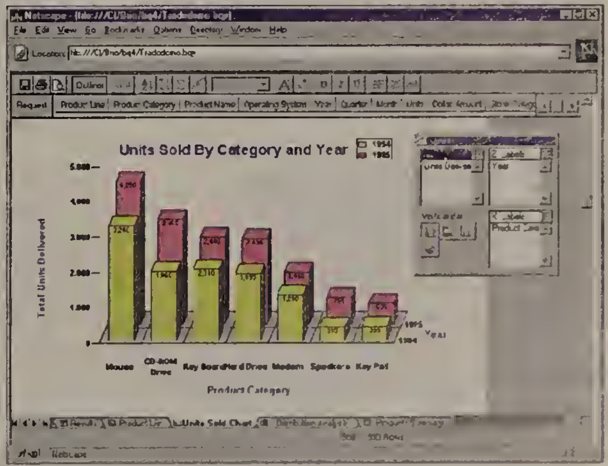
Desktop query tools still have their place, analysts said. But even vendors concede that the idea of letting Internet-based servers do some or all of the query processing is alluring to users that have far-flung employees.

Take, for example, LSI Logic Corp.

The Milpitas, Calif., semiconductor maker has about 200 employees using Brio Technology, Inc.'s BrioQuery desktop tools. The company wants to expand that to 500 users by the middle of next year and is starting to beta-test a World Wide Web query server and plug-in client combination introduced by Brio last week.

"We have design engineers and salespeople all over the country, and we want to spread [reports] to them," said Raymond Lee, a staff programmer and analyst at LSI's information

Reports, *page 74*



**Brio Technology's brio.web.warehouse** *tools combine a query server with a Web browser plug-in that lets users view and modify charts and other parts of a report*

# Team mixes Web, ATM, cable modems

By Kim Girard

Like an NFL football game, the Jacksonville Jaguars World Wide Web site needed exciting sights, compelling sound and — most of all — fast action.

The challenge for Jaguars information systems manager Bruce Swindell was to find the skills and technology needed to bring the voices of the coaches, moves of the players and statistics of the game online.

A superfast pipe to the organization's Web server and Asynchronous Transfer Mode (ATM), a packet-switching technology that transmits cells of voice, data and video, helped fit the bill. The combination of technologies has helped the Jaguars constantly update the site during and after games.

### Supporting cast

Last June, the Jaguars hired Continental Cablevision to host the Web site (jaguars.nfl.com) and act as the team's Internet service provider. RAMWorks, a small multimedia programming company, helps update and enhance the site with audio and video clips.

**Jaguars IS manager Bruce Swindell**: *'I don't know what I did without [ATM and a cable modem]'*

Swindell credits Continental with persuading the team to design a Web page tailored to cable modem users — those capable of accessing the site at speeds ranging from 250K bit/sec. to 25M bit/sec., depending on the strength of their local networks. Anyone with a modem can surf the site, but a 28.8K bit/sec. or cable modem makes the site's multimedia files much easier to download, Swindell said.

"We want it to be something that folks dialing in at 28.8 would enjoy. Continental wanted to do it [at] high speed because they're rolling out cable modems," he said.

### Stronger, faster

The Jaguars, who use a Windows NT platform throughout their network, now have access to Continental's powerful ATM network that runs on a 622M bit/sec. backbone. The organization uses Fore Systems, Inc.'s ASX-200BX ATM switch to connect stadium office desktops to the Web server at 155M bit/sec. speeds.

Swindell and his Internet coordinator, Todd Hardie, use Continental's cable modems at home to zip through the more than 200 pages at the Web site.

"After using ATM and a cable modem, you get spoiled," Swindell said. "I don't know what I did without it." Continental now leases the modems in the greater Jacksonville, Fla., area. So far, 300 of Continental's 1,000 Internet customers use them.

Swindell also has ATM connectivity at his desktop at work, where six computers in his office are equipped with ATM adapter cards.

"The Jaguars are wicked fast from their desktop," said Jerry Register, regional network engineer at Continental's southeastern regional office in Jacksonville. ATM enables the organization to upload all the data after a game — including player statistics, film clips and audio — to the Continental Web server at a rate of 155M bit/sec. This makes it quickly available to fans.

The network is also used to rebroadcast the game's radio play-by-play over the 'net. The Jaguars can't post game footage on the Web site for legal reasons, but player interviews will be offered soon.

Surfers will also be able to point and click with a mouse to view the team's home stadium from different angles.

# Every intranet needs a name

CONTINUED FROM PAGE 73

my passion," he added. Indeed, Marlin recently posted on the World Wide Web a 10-stanza poem about Oasis.

Max Schutte, webmaster at Nampak Group, a packaging company in Cape Town, South Africa, said he chose the name Net-Zoo to help spur discussion about intranets at his company.

"Not many people know what an intranet is and are too embarrassed to ask. But Net-Zoo — who can blame you for asking what that's about?" Schutte said.

Owens-Corning held a companywide contest, publicized via internal electronic-mail publications, to name its intranet baby. FiberSpace was picked because it sounded like cyberspace and pertained to the company's business, said Mark Amos, an IS professional at the Toledo, Ohio, company.

But now, a bigger intranet called GlobaLink has supplanted little FiberSpace. "I'm ambivalent about personification of technology," Amos said. "Perhaps there is some psychological value for people afraid of technology."

Then again, it could be an ego thing, said Mark Kocak, a leakage specialist at utility Columbia Gas of Ohio.

Volunteers who started the first intranet there wanted to call it Lingua Franca. Kocak was partial to the name Middle Earth, which conjured the idea of "living, working and learning in a new world as it unfolded," he said.

But after several colleagues on different committees reviewed the name submissions, they decided on the decidedly corporate ColumbiaNow.

As disappointing as that might be, Kocak said, "naming intranets is easier than setting up the infrastructure."

> "Not many people know what an intranet is and are too embarrassed to ask. But Net-Zoo — who can blame you for asking what that's about?"
>
> *Max Schutte, Nampak Group*

# Firewalls offer protection

CONTINUED FROM PAGE 73

have to establish the mission of the firewall, said Tom Nolle, president of CIMI Corp., a consultancy in Voorhees, N.J. "The two fundamental missions of firewalls are to enforce a connection policy and to convert [internal] IP addresses to [external] ones."

### Router double duty

Sites that only need to enforce a connection policy, such as who has access to what Internet or intranet resources, can get by with a router that does double duty as a firewall or with a stand-alone firewall system, Nolle said.

But networks that have to convert internal network addresses to addresses that can be used to access the Internet will need a firewall package that provides address conversion, Nolle said. This capability can also be used to block access to an intranet or the Internet from inside the organization. Products from Cisco Systems, Inc., Checkpoint Systems and Raptor Systems, Inc. support address conversion.

Peterson said users stand to gain more functionality when firewall vendors and makers of network monitoring packages team up. The thinking is that with router firewalls, if you can't see them, how do you know how they are doing, he said.

Remote access vendor Ascend Communications, Inc. and network monitoring power Optimal Networks, Inc. developed a protocol that lets their products work together. Specifically, the Optimal packages log the addresses of all incoming calls for the IS manager to scan. Users can review the list and have the package tell the routers to block access attempts from certain addresses.

> "The two fundamental missions of firewalls are to enforce a connection policy and to convert [internal] IP addresses to [external] ones."
>
> *Tom Nolle, CMI Corp.*

# Reports

CONTINUED FROM PAGE 73

technology department. But, he said, putting Brio's full front-end tool at every PC would be an installation and support hassle.

Brio's Web-based products are available now, with prices starting at $19,950 for the brio.query. server software. Unlimited licenses for a basic report-viewing client are included with the server. A plug-in that puts Brio's desktop analysis capabilities in a browser costs $395 per user.

**Tool time**

Desktop query and reporting tools put processing power in the hands of end users. This requires that raw data be moved down to PCs to run queries. Server-based tools handle the processing and send out the query results, which cuts down on network traffic but also limits end users' flexibility.

Brio isn't alone in cozying up to the server concept.

Cognos, Inc. in late October introduced a query request server to augment its Impromptu desktop tools in non-Internet environments. A more powerful report server is being developed as part of a 'net-based offering scheduled for next year, Cognos said.

"In a lot of cases, companies are more comfortable having their processing done on a server," said Karen Williams, marketing manager for Impromptu at Cognos. Server capabilities mean big customers "aren't tying up their networks while they move [raw] data around" to PCs, she said.

Land O' Lakes, Inc. had opted for server-based reporting before the 'net entered its thinking. The Internet's advent as a means of reaching remote users helps validate that decision, said Adam Krauter, manager of information and technology at the Minneapolis-based dairy farm cooperative.

"We just don't have the manpower to support that kind of [desktop] tool" at remote sites, Krauter said. Instead, Land O' Lakes this month will start using the Web to link salespeople and independent food brokers to a reporting system built around Information Advantage, Inc.'s server-based DecisionSuite software.

Expanded browser-based capabilities that Information Advantage announced last week should give the remote users more than enough power to manipulate reports, Krauter said.

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## New Products

**Micro Design International, Inc.** has announced CD-Express Connect, a LAN-attachable CD-ROM server for Windows NT environments.

According to the Winter Park, Fla., company, the server distributes CD-ROM data to LAN and World Wide Web clients. It requires no other dedicated servers or special drivers.

Pricing starts at $3,895.

▶ *Micro Design International*
*(407) 677-8333*
*www.mdi.com*

**Documentum, Inc.** has announced RightSite, software for managing information found on the World Wide Web.

According to officials at the Pleasanton, Calif., company, RightSite is an extension of the Documentum Enterprise Document Management System.

It was designed to assemble Web page information on the fly and deliver it to a particular user. It is enabled with a server that acts as a repository and provides library services, workflow coordination and virtual links for selecting the appropriate version of a Web page.

Pricing starts at $20,000 per server.

▶ *Documentum*
*(510) 463-6800*
*www.documentum.com*

**Alpha Microsystems** has announced AlphaConnect Pro and AlphaConnect StockVue, software for harvesting information from the World Wide Web.

Officials at the Santa Ana, Calif., company said AlphaConnect Pro can trace company competitors or other selected information for automatic retrieval from the Web.

AlphaConnect StockVue uses Microsoft Corp.'s 32-bit ActiveX technology for retrieval of stock and fund quotes, company officials said.

AlphaConnect Pro costs $140, and AlphaConnect StockVue costs $39.95.

▶ *Alpha Microsystems*
*(714) 957-8500*
*www.alphaconnect.com*

**Dataware Technologies, Inc.** has announced Dataware Electronic Publishing Management System for electronic publishers.

According to officials at the Cambridge, Mass., company, the system allows users to create publications from different sources such as Hypertext Markup Language and word processing files and distribute the publications over the Internet, on CD-ROM and other ways. A management system, server, client and development software are included.

Pricing starts at $15,000.

▶ *Dataware Technologies*
*(617) 621-0307*
*www.dataware.com*

**Pacific Coast Software** has announced SiteEdit Pro for remote Hypertext Markup Language editing from within any standard World Wide Web browser.

According to officials at the San Diego company, the software works with Pacific Coast's Common Gateway Interface SiteEdit server. SiteEdit Pro lets users specify individual editing capabilities to multiple users.

Pricing starts at $179.

▶ *Pacific Coast Software*
*(619) 675-1106*
*www.pacific-coast.com*

**Fortner Research** has announced HDF Browser, a free tool for viewing scientific data stored in the Hierarchical Data Format (HDF). It is available for download on the company's World Wide Web site.

The Sterling, Va., firm said HDF Browser provides full access to an HDF file through a simple user interface. HDF is a data standard that is being used by NASA for part of the Mission to Planet Earth project to monitor global environmental change.

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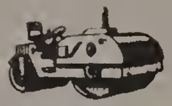

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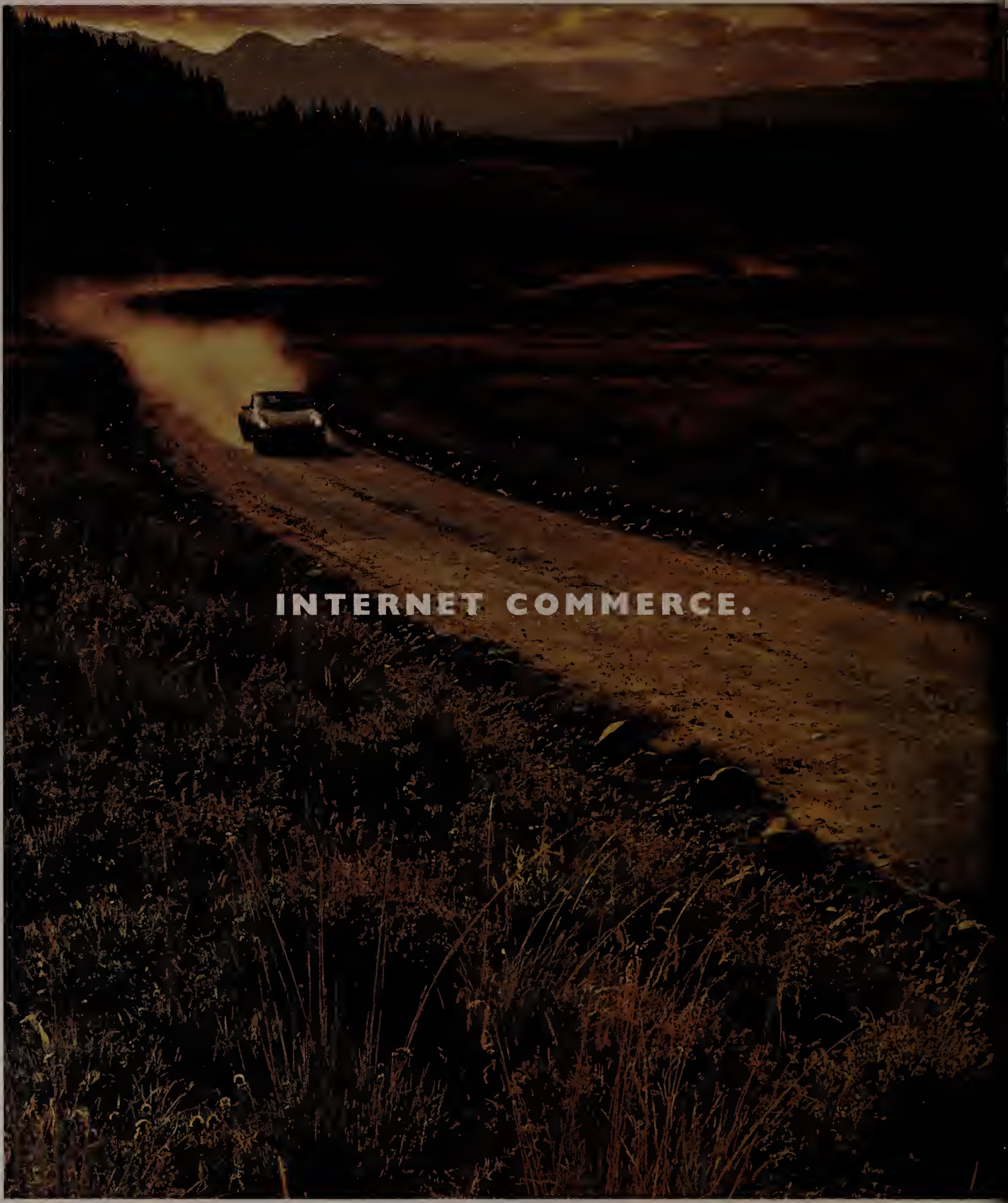

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# Corporate Strategies

GTE slashes downtime
with $100 million
IS overhaul, **82**

## The Internet gallery

### Digital Commerce to link fine-art buyers, sellers on the Web

By Mitch Wagner

**Online commerce**

Until now, art on the Internet has consisted of a few scattered museum sites and "Dilbert." Digital Commerce Corp. plans to change that.

The Reston, Va., start-up hopes to turn the Internet into a profit-maker through fine art — paintings, sculptures and other works — sold and bought online via a finely focused network of artists, dealers and collectors.

Digital Commerce in February plans to unveil its World Wide Web-based "Collectors' Trust" service. The plan is to sell artworks that range in price from $500 to millions of dollars, said Richard Gravely, a founder of Digital Commerce. Galleries and artists will register art with Collectors' Trust, and images and descriptions of the art will be posted on the Internet.

Gravely said part of the appeal of Collectors' Trust will be its decidedly low-key entry, via the Internet, to the highbrow art world. "It will eliminate the intimidation factor of going into an art gallery," Gravely said. "It will provide a prospective buyer with a [self-directed] way to educate himself about what constitutes value in the art world."

Collectors' Trust is a rather exotic service, but it is an example of an Internet application that is becoming common — "supervertical applications," said Brad Meinert, an analyst at Input in San Francisco.

A vertical application serves individual companies in single industries; a supervertical application links business partners — buyers, sellers, trade associa-

**Art on the Internet,** *page 82*

KATHERINE LAMBERT

**Digital Commerce's John Saunders** *leads a staff of 48 that already supports a 'supervertical' Web site. The site brings in $100,000 per month by linking buyers in federal government agencies with computer equipment sellers.*

**Aegon set up** *a mock home office at its headquarters to give potential telecommuters a feel for what it's like to work at home*

## Telecommuting pilot test proves space-saving plan

By Mindy Blodgett

The journey from telecommuting pilot test to outright policy can be an arduous process, according to staff members at Aegon USA, Inc.'s Advanced Financial Services Division in Clearwater, Fla.

But testing the waters with a small pilot project is better than jumping right in to a full-blown telecommuting program, said Kim McGonegle, a telecommuting project manager at Aegon. "It can be really complicated to start a telecommuting program, and a company owes it to itself to closely examine everything," she said.

Aegon started the pilot project when it faced rapid growth and shrinking office space. Rather than spend money on more space, the company decided to save by having some employees work at home.

By starting with a pilot, Aegon controlled telecommuting costs and learned from its mistakes, McGonegle said.

Aegon launched a six-month test with 20 telecommuters about 18 months ago. The pilot test became policy this spring, and the company now has about 60 telecommuters working at home at least three days a week, McGonegle said. More telecommuters

**Telecommuting,** *page 82*

## Master Lock takes fear out of customer service overhaul

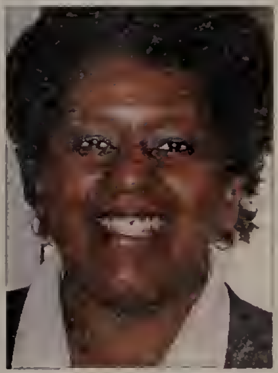
By Thomas Hoffman

The customer service department at Master Lock Co. historically hasn't dealt well with change.

"We changed our lunch schedule, and you'd have thought the Pope was visiting," said Jody Sneed, director of customer service at Master Lock.

So when the company decided to replace a 30-year-old host-based customer service system with a client/server model, MasterLink, staff members approached the idea "with a little bit of fear and dread," said Mary Anne Millard, a customer service representative.

"We knew there would be a lot of extra hours, that we'd be eating, sleeping and breathing this conversion," Millard said.



THOMAS HOFFMAN

**Master Lock's Jody Sneed:** *'You can't rush people through a [new system] learning curve'*

The company launched an intensive, user-sensitive campaign to help employees adapt to the MasterLink system.

The effort paid off. Since MasterLink went live last year, Master Lock's "fill rate," or order-fulfillment rate, has zoomed from 78% to 93%, Sneed said.

To get Master Lock's customer representatives to embrace the new system, Sneed and other members of the MasterLink team sat down with each of them and explained how their jobs would be made eas-

**Master Lock,** *page 82*

# GTE cuts downtime with $100M revamp of IS

By Thomas Hoffman

As recently as 1993, GTE Corp. customer service representatives were suffering an eye-popping 800,000 employee-hours of annual downtime to their information systems.

With telecommunications deregulation staring GTE in the face, the company knew it had to make dramatic systems changes or lose customers en masse.

Since then, GTE has embarked on a $100 million initiative that improved availability tenfold, reducing to eight hours the amount of annual downtime per customer service representative, said Bill Stoeffler, director of GTE's enterprise support center in Temple Terrace, Fla.

Further refinements are being planned, such as additional upgrades to its network infrastructure. Those refinements are expected to deliver another improvement in systems availability — to 48 minutes of annual downtime for each service worker — by the end of 1998, Stoeffler said.

"We feel it's critical to be at [this] level of service to compete in the deregulated market," he said.

### Systems upgrades

To improve its customer service levels, GTE hired IBM Consulting Group to help it evaluate and improve its customer service processes. Armed with 1,000 recommendations, GTE's most important action was to establish an operations staff to improve problem solving and recovery time on the client/server customer information systems the company installed in 1992.

"The key thing for us is that we now have a single point of contact for all of the systems we use," said Karen Mounts, general sales manager of customer contact at GTE in Tampa, Fla.

Customer representatives previously would spend "tons of time" finding the appropriate IS staffer to work on an outage or system snafu, Mounts said.

Those communications gaps helped contribute to the inordinate amount of downtime that GTE customer representatives experienced with their systems.

**GTE's David Johnson:** *Call centers generated $20 million in improved productivity*

GTE's uptime project has generated $20 million in improved productivity during the past three years, said David Johnson, director of GTE's information control center in Fort Wayne, Ind.

And much of the $100 million GTE has spent in the past three years to finance its uptime program has come from cost-savings achieved through data and print center consolidations during the past five years, Johnson said.

### Consolidation

The data center consolidations have made a big difference in systems availability. When GTE ran 15 data centers, a single systems glitch could disrupt up to one-third of its telephone operations, Johnson said. GTE now has three data centers, he said.

As a combination local and long-distance carrier, GTE hasn't had to struggle with the regulatory constraints of entering the long-distance market with which regional Bell operating companies such as Nynex Corp. and BellSouth Corp. have had to contend.

"GTE is in great shape," said Richard C. Toole, a telecommunications analyst at Merrill Lynch & Co. in New York. GTE "has lots of customers like the [Bell operating companies], but they don't have all the regulatory gobbledygook to contend with," Toole said.

GTE's client/server architecture includes a mix of IBM mainframes and RS/6000s, Hewlett-Packard Co. HP 9000s and Tandem Computer Corp. Himalaya systems.

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# Master Lock

CONTINUED FROM PAGE 81

ier. Master Lock also developed a video that dramatized how much easier it would be to respond to customer inquiries by using the new system.

### Comfort counts

The company counted on the training and several other techniques (see chart) to get customer representatives comfortable with the idea of change and with the adjustment to a completely new system.

The Milwaukee-based manufacturer last December replaced a 30-year-old NCR Corp. VRX system with a $700,000 client/server-based system that was designed to more closely track the status of a customer's order from receipt to shipment.

Master Lock earlier this month finished upgrading the 40 customer service representatives from the Windows 3.1 PCs they had been using for the past year to machines that run Windows NT 3.5.1.

Users are connected to an Oracle Corp. database through Fiber Distributed Data Interface connections to Digital Equipment Corp. Alpha 2100 servers that run VMS, said Jeff Forbes, director of information systems at Master Lock.

Millard said Master Lock's small, intimate, four-month training sessions allowed customer service representatives to learn the system faster than they would have in a theater-style, weeklong cram session.

Customer service experts also praised Master Lock's innovation. Richard Whiteley, vice chairman of The Forum Corp., a training and consulting firm in Boston, said it was the first time he had ever encountered a company leading a prayer service for a new system. "There's some humility in that, which is refreshing," said Whiteley, who last year co-authored with Diane Hessan *Customer-Centered Growth*. The book is published by Addison-Wesley Longman Publishing Co. in Reading, Mass.

**Group support**

Master Lock used the following tactics to win staff support for a new system:

- Launched an ice cream break every Friday
- Held a half-day stress relief workshop
- Held a memorial service for its old NCR system
- Gave employees sweatshirts and plaques in recognition of the extra hours put into the conversion
- Held a group prayer service the day before the system went live

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# Art on the Internet

CONTINUED FROM PAGE 81

tions and regulatory agencies — into a network.

Digital Commerce has a similar supervertical Web application already running. It is the seven-month-old FedCenter site (www.fedcenter.com), where federal government agencies can buy computer equipment. Digital Commerce's revenue is $100,000 per month, collected entirely from the FedCenter site, said Chief Information Officer John Saunders. A staff of 48 supports the Web site's operation.

At Collectors' Trust, potential buyers will be able to browse a database of art and either buy online, sight unseen in the real world, or arrange a visit to the seller for an on-site viewing.

Besides the descriptions entered by the sellers, the system will use imaging software from Virage, Inc. that can extract information from the image of the artwork and look for similar images based on color and other criteria.

### Volume is key

The fees for Collectors' Trust will be a $25-per-month listing fee for each piece of art, a $25 transaction fee and $12.50 monthly membership for each buyer and seller. Digital Commerce will make its profit on volume, Gravely said.

The goal of the system isn't just to bring together buyers and sellers, but also to reduce fraud and forgery, Saunders said.

"The annual amount of art theft is in excess of $1 billion a year, and there's an awful amount of forgeries out there," Saunders said. Digital Commerce will offer appraisal services, enter each piece of art into its database and put a nondestructive tag on the artwork for authenticity. If a discrepancy arises in the records, Digital Commerce will know to suspect forgery.

Sellers will be protected because buyers will have to deposit the sales price in escrow before the artwork changes hands. And buyers will be protected because of a 48-hour waiting period on that escrow to ensure that buyers get what they pay for.

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# Telecommuting

CONTINUED FROM PAGE 81

will be deployed, she said.

When telecommuters come to the office, they participate in "hoteling," which means sharing a desk and work area with another employee. During the pilot, Aegon tested equipment from several remote-access and hardware vendors. This worked to the company's advantage; much of the trial equipment was free, McGonegle said. Aegon tested modems and networking modes. It set up a mock home office to give prospective telecommuters a feel for working at home.

Many employees wanted to participate, but only those with above-average work records were chosen after extensive interviews, McGonegle said. Supervisors also looked for employees who had enough extra workspace in their homes and adequate child care.

Employees and telecommuters say productivity has improved. Aegon plans to do a more quantitative study of productivity, McGonegle said.

The change was dramatic for Terri Ahern, a quality assurance coordinator in Largo, Fla., who was part of the pilot and now telecommutes every day.

"I was feeling really cramped in our old office," Ahern said. "I find I can get much more done. It is much more quiet here at home."

Aegon primarily provides 28.8K bit/sec. dial-up access. Some telecommuters use Integrated Services Digital Network or frame relay because they need to transfer a lot of data. Aegon provides 486-based PCs from Dell Computer Corp. and Compaq Computer Corp. and office furniture.

Aegon pays from $6,000 to $8,000 per worker for hardware, software, training and other costs. It spends about $300 in monthly support and communication expenses. Ahern said she misses the camaraderie of the office, "but I feel spoiled, I don't think I could go back to working in an office."

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# Europeans still see IT spending as a money pit

By Jeanette Borzo
CANNES, FRANCE

Cultural differences divide information technology industries in the U.S. and Europe — particularly when it comes to the Internet, European industry leaders said.

"It's a state-of-mind issue," said Andreas Barth, a senior vice president at Compaq Computer Corp. "The Americans are much more open to technology and like to communicate. The Internet is about empowering people," something that comes more easily to Americans, he said.

European companies continue to think of IT spending as a cost rather than an investment, which is part of what hampers spending in Europe, said high-tech executives gathered here last week at Gartner Group, Inc.'s European Symposium/ITxpo '96.

"All my professional life, I received a bonus for decreasing IT costs," said Jean Marie Descarpentries, chairman and CEO of France's Groupe Bull. "But IT is an investment, not a cost."

## Global competition

To catch up with U.S. IT vendors, Europeans must change their attitude, panelists said. "We have to get more gutsy and not always look west to see how the Americans are doing it," said Gerhard Schulmeyer, president and CEO of Germany's Siemens Nixdorf Informationssysteme AG. "We have to realize we all are losing if we don't get into technology."

### Slow to catch on

The Internet is a key area where Europe trails the U.S., panelists noted, but that can be seen as more of an opportunity than a problem. "The Internet is a fantastic opportunity, but the key problem is security," Descarpentries said. "We are investing in security. We will develop a lot of solutions, and security will be our added value to Internet services."

Increased sales potential motivates Bull to secure its Internet-based applications. "For us, it will be our fourth channel of distribution," Descarpentries said. The others are direct sales, channel marketing and telemarketing.

In part, the cost of local telephone calls in Europe — especially when compared with the cost of U.S. local calls — continues to hamper Internet popularity, panelists said.

"The access fee [to the Internet] in the U.S. is so inexpensive that it is not even a point of discussion," said Paul Wahl, CEO of Germany's SAP AG.

Still, panelists were quick to point out the potential for increasing corporate Internet use in Europe.

"Technology-wise, we have everything it takes," Schulmeyer said. "We have to do more to encourage our European users. If we accept that we are a knowledge-based business, we have to connect our brains. The Internet is the ideal place to do that."

In general, European IT businesses would do well to increase the pace at which they can change, Wahl said.

"People who can change their core business fast will do better," he said. "We need to embrace a corporate culture where speed is more important than money."

Intranets offer the quickest path to using the 'net advantageously so firms can communicate with their employees and customers, panelists said.

"It's intranets that offer big advantages," Barth said. "We have linked up our channel partners, and we have an internal intranet for all our employees."

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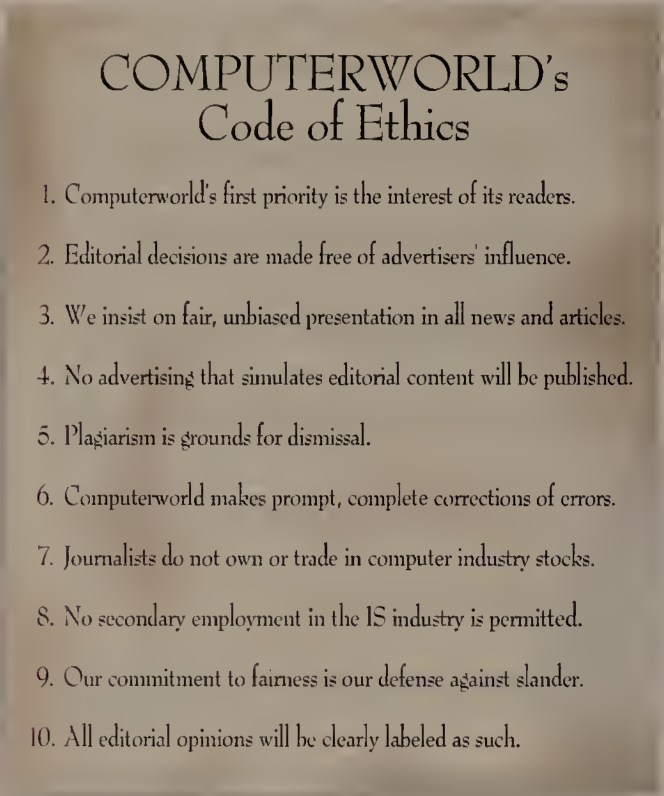
Borzo writes for IDG News Service in Paris.



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# COMDEX FEVER!!!

And **if you want to cure it, read on** for some good medicine.

BY ALAN S. HOROWITZ

It's like teenage puppy love, an affliction that — though widespread, predictable and devastatingly distracting — has no known cure. Every November, this disease rains upon unsuspecting computer folks in Las Vegas.

The malady? Comdex Fever.

Don't bother looking it up in a medical text. It isn't there. But don't think it's the disease equivalent of vaporware. It exists.

"My guys get a little goofy," acknowledges Christopher Stanton, executive vice president at Direct Marketing Technology, Inc. in Schaumburg, Ill. "Everybody wants to buy everything and try it real quick."

Scantily clad women. Live music. More schlocky trinkets than can be found in Times Square. Free demonstrations with claims that the products really perform. Every trick in the hypester's manual can be found in Vegas. That's why Stanton describes Comdex — which will draw thousands to Las Vegas next week — as "a big candy store for the technical guys."

And like a candy store, what you come away from Comdex with can make you sick if you lose control.

## WORDS TO THE WISE

John Chapman, information architect at Amoco, provides the following advice to those susceptible to Comdex Fever:

① **Remember that an awful lot of what people tell you was written by marketing people**

② **Wear comfortable shoes**

③ **Bring lots of business cards**

Stanton remembers a guy who color-coded his inches-thick Comdex directory. Although the directory broke down vendors by product type, he went further by using a private color-coding system. "This guy must have spent all night color-coding every single category," Stanton marvels. "He also had every pin they ever passed out from Comdex, too."

Even experienced, jaded professionals fall victim. Michael Rego, director of national accounts at U.S. Motivation, a meetings and incentive management firm in Atlanta, says he catches Comdex Fever every year. At the past few outings, the disease hit hard: He bought stock in three companies he saw exhibit at the show.

These are all symptoms of the fever, which we define as buying into the hype and excitement of Comdex to the point of compromising rational thought, perspective and common sense.

### TREATMENT PLAN

Because no cure exists, focus on prevention. "If somebody is going for the first time, I remind them that this is marketing, it's theater, it's show business," says Dan Bent, chief information officer at Benefit Systems, Inc. in Indianapolis.

**BLAME IT ON UNCLE SAM**
Why are companies getting low payoffs from IT? Paul Strassmann says the government shoulders billions of dollars' worth of blame. PAGE 94

Next, he advises, "be thinking about the clients you have, the problems they have been bringing to you and solutions to those problems. Talk to four or five vendors at the show that have the products you need, and you'll get a feel for the best of breed and which products offer the best value."

JAMIE HOGAN

Create a comprehensive plan long before the show. Bent solidifies his schedule by late September. "If you don't make appointments to see people, you won't get anything accomplished," he says. And he warns, "Go there with a game plan, a goal of what you want to learn. Going to Comdex without a plan is a complete waste of time because you will get overloaded."

John Wisniewski, manager of advanced technologies at Wm. Wrigley Jr. Co. in Chicago, also stresses thorough planning. "Before we go, we know the vendors we're going to see, the sessions we want to see, the rationale behind it, ... what business purposes it serves," he says.

Bent lets people choose what to focus on based on their own interests. "Let him be the expert on those products. The industry is way too broad for any one person to know everything about everything," he says.

But Stanton, who will send seven information technology staffers to Comdex, divides responsibilities according to product types tied to his needs, such as networking, peripheral devices, administrative/office products and software. Before leaving, everyone will have studied the previews and know whom they will see at the show.

Prior to PC Expo one year, John Chapman, information architect at Amoco Corp. in Chicago, focused the troops by challenging them with a "scavenger hunt." They were asked to come back from the show with the five most interesting technologies and the five most dangerous ones: those that are faddish, largely unproved or, if implemented, could result in potentially costly upheavals within the organization. Everyone gathered with their lists, and a spirited debate ensued.

Richard Miles, manager of technical services at Prentiss Properties Ltd. in Dallas, meets each evening during the show with his show partner to discuss what they've seen, what they want to see the next day and who will go to what. It keeps them focused.

Rego and his colleagues meet after the show to discuss what did and didn't impress them. Chapman's and Rego's approaches let showgoers decompress after the event.

Careful planning, keeping the troops focused, letting them pursue their interests, keeping them occupied by scheduling how they spend their time and knowing what problems you want to solve — these are all prescriptions for preventing the onset of Comdex Fever.

And once you've done everything possible to prevent the dreaded scourge, recognize that there are some things you just can't control.

"It's like why guys ride Harleys," Stanton says. "How do you explain it other than, 'It happens'?" ■

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Horowitz is a freelance writer in Salt Lake City.

**Online this week**
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**Do you have any tips on how to cure Comdex Fever? Share them this week on our Web site (www.computerworld.com).**

# F.Y.I.

## HR steps in to help at Sears

Here's a twist on the common practice of putting IS professionals into business units so they can understand users' needs. At Sears Roebuck and Co., a human resources professional works in information systems to help the technical staff recruit and keep qualified people.

What can HR do for overburdened, beleaguered IS? Help it get more money, for one thing. Sears overhauled its IS pay structure in March 1995, boosting some salaries as much as 20% to help it compete with other Chicago-area firms. The HR representative in IS, Ryland Harrelson, surveyed pay at Chicago-area IS organizations. He was careful to compare people who have the same responsibilities rather than just the same titles. If IS had argued for the raises, "we would have been doing it more on gut feeling," says Bernard Bartelli, vice president of retail IS.

IS still controls the hiring process, says Bartelli, who, with Harrelson, serves as "a facilitator, a leader, a helper." Harrelson is working on a "development and succession process" to identify each IS professional's strengths and weaknesses, provide training and coaching to help them improve and then measure their progress over time. That helps Sears not only develop a "bench" of rising stars, but also recruit outsiders. "When ... [recruits] find out we have a development and succession program, a lightbulb goes off," Harrelson says. "They know they're going to be recognized for their contribution." — *Robert L. Scheier*

## Less of a chore

Marriott International, Inc. has taken much of the hassle out of hiring with a telephone and computer-based system.

The system, Selectech, from Employers Resource Corp. in Norwalk, Conn., eliminates paperwork and speeds up the hiring process for Marriott's U.S. operations. Job seekers apply over the phone and are automatically screened. A person who qualifies for a job at one of Marriott's hotels or in another business unit is scheduled for an interview by Selectech's automated scheduling system.

Marriott launched the system this summer in 10 major U.S. cities and plans to have all U.S. operations on board by April, says Richard Bell-Irving, vice president of human resources for lodging at Marriott.

In the past, he says, each hotel would have had to create its own newspaper ads or talk to local recruiters. The system "streamlines the process and makes it easier for people to get an opportunity" to apply for a job, Bell-Irving says.

On any given day, Marriott has more than 1,000 jobs to fill, says J. W. Marriott Jr., company chairman and president.

Bell-Irving calls the debut a success. He says Marriott has had more than 70,000 calls from applicants and hired more than 600. — *Rick Saia*

More F.Y.I., *page 94*

# NO Band-Aid Approach

By Robert L. Scheier

**Johnson & Johnson's** training program helps IS managers work together to move the company forward. And other parts of the company have noticed.

NICK CARDILLICCHIO/MONTAGE

**Wilma Horne, vice president of information management at J&J's Ethicon unit, figures she's halved the cost of a new pricing application by sharing development with another manager. Ethicon makes surgical sutures and other products.**

Nature abhors a vacuum. So does an IS manager sent to a training session.

When information systems executives are thrown into training without a clear idea of what they're supposed to learn or do differently, little or nothing changes. That's dangerous for a company trying to keep up in dynamic markets such as health care.

Johnson & Johnson (J&J) takes a different approach with its five-day IM (Information Management) Institute, which over the past two years has brought together 500 top IS managers from J&J's 170 highly independent operating units. Developed with MIT's Sloan School of Management, the IM Institute aims to focus the IS chiefs on strategic projects rather than day-to-day operations and encourages them to work together to cut costs and development times.

Some managers are already benefiting. Wilma Horne, vice president of information management at J&J's Ethicon, Inc. unit in Somerville, N.J., figures she's cut the cost of a new pricing application in half by sharing development with another manager she met at the institute.

Prior to attending the course, IS managers receive a detailed explanation of the institute, plus case studies that illustrate the major points. By the end of the course, managers are supposed to have a "plan for how to take IM from a back-room function to a fully integrated part of the business," says Arnold Trillet, vice president of human resources for the 3,500-person IM function.

"This is a very planned process . . . , not just to educate, but to move the organization forward," says Jack Rockart, director of the Center for Information Systems Research at the Sloan School in Cambridge, Mass., who worked with J&J to set up the institute. "I can't imagine equivalent change coming out of a one-day or one-week program without a clear vision of where they're going."

The process starts with a survey that asks users how they view their systems and IS' contribution to their business. At their first day at the institute, IS managers discuss the findings — and the results aren't always rosy.

When Craig Lamb and most of his staff attended the institute last November, their 50-person support center in New Brunswick, N.J., had gotten "only fair to average" marks, he says. The center supports 900 users throughout J&J's North American consumer businesses, which make products such as Band-Aids and mouthwash. The stage had been set for "a contentious relationship" with the businesses when the responsibility for major systems was taken away and given to the support center, says Lamb, vice president of information management at the center. Another problem: Sometimes the center wasn't given the funding or staff to properly support those systems.

The second day tackles how to align IM with the business, the third day is a high-level discussion of how technology affects society, and the fourth is devoted to managing relationships and people. Working 12-hour days, the IM managers devise plans to improve their organizations. Those plans are presented to their peers on the final day.

After attending the institute, Lamb dispersed his centralized staff into the business units to help ensure that they "are not wasting energy building the wrong systems to solve the wrong problem."

Lamb says he also learned that his managers needed to spend more time making better decisions rather than "rolling up their shirtsleeves and writing code and designing systems." Once he made that clear, he says, their behavior changed quickly because their compensation is tied to meeting objectives Lamb and his staff set.

Horne says the institute helps her move beyond the infrastructure issues that used to soak up 60% of her time. "Having heard what J&J is trying to do with infrastructure," such as setting companywide standards for everything from PCs to telephone systems, Horne says she can adopt those standards and spend 75% of her time on more strategic issues.

"Today, if I were going to replace a suite of application systems, I would know right away that J&J has a standard," Horne says. "I would start looking at whether I can use [the standard] instead of shopping around the umpteen thousand manufacturing applications out there." J&J officials declined to identify the standard suite.

So far, J&J has only anecdotal evidence of benefits to show for the more than $1 million annual cost of the course. Management hasn't yet surveyed users about whether they see improvements, but business managers have been "very impressed" with the plans IS managers developed at the institute, says Ed Parrish, corporate vice president of information management. It helps that J&J has historically devoted big bucks to training.

If demand for its work is any indicator, the institute has been a roaring success. Trillet and Parrish are developing a similar course that teaches business managers how to use information technology as a competitive weapon. "And it's almost like a landslide of people who want to come to it," Parrish says. ■

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Scheier is a *Computerworld* senior editor, management.

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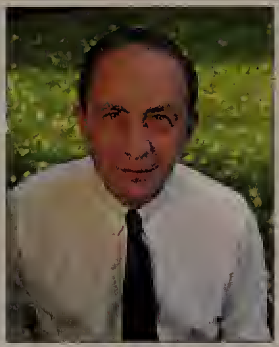
Paul A. Strassmann

# Workload without payoff

*Government regulations deserve much of the blame for the low payoff from IT. Major U.S. companies spend billions of dollars on computer processing for federal reports.*



There's an old trick I used when I was a CIO. Whenever I had to explain to my boss why I needed to increase the IT budget, I showed him a long list of new government reporting requirements for accounting, personnel, environmental safety, equal opportunity administrators, transportation and health care. That list always grew. There were years when I could explain that more than 20% of my requests for more money offered no payoff other than the avoidance of penalties or even jail sentences.

So I've always suspected that one of the likely explanations of the "computer paradox" — defined as rising computer expenditures without any evidence of rising productivity — was spending that generated no additional value, such as responding to government requirements.

Despite all the government initiatives that claim to cut business-reporting burdens, there are more than 200,000 extra pages of forms, laws, regulations and administrative instructions generated from Washington, state capitals, counties and municipalities every year, according to *Forbes* magazine. The result: new workloads.

Federal paperwork compliance costs range from $2,267 to $6,726 per year per employee, depending on a firm's size and industry classification, according to economics professor Thomas D. Hopkins in his November 1995 report to the U.S. Small Business Administration, "Profiles of Regulatory Costs." Using Hopkins' estimates, I've compared compliance costs with statistics to which a corporate CIO can relate.

### PAPERWORK, THE HIDDEN TAX

To see how the cost of government paperwork affects companies, I compared Hopkins' numbers with data on corporate overhead and taxes paid for 1994.

I extracted from the Disclosure, Inc. database information about the taxes paid by the 2,808 largest taxpaying U.S. corporations, with a total of 29.4 million employees. I also collected data on corporate overhead on about 667 major U.S. corporations, with a total of 2 million employees, that didn't pay any taxes. (Disclosure, in Bethesda, Md., is an authoritative source of financial data used by Wall Street analysts.)

Taxpaying corporations spent an estimated $98 billion in federal paperwork in 1994 so Washington could collect $175 billion in taxes. Without the paperwork, corporate pretax profits could have been 20% higher. Some firms incurred as much as $10 of compliance paperwork for every dollar of taxes paid. Such high ratios are the consequence of a disproportionate burden of paperwork on smaller companies that have to fill out the same forms as giant corporations.

Companies that didn't pay any taxes incurred an estimated total compliance cost of $6.3 billion. Without the paperwork, their pretax losses would have been cut by one-fourth. One hundred and eleven companies that didn't pay any taxes would have reported pretax income instead of pretax losses.

To what extent did the federal paperwork compliance cost explain corporate overhead? One measure is the number reported as sales, general and administrative (SG&A) expense. For the taxpaying corporations, the compliance costs accounted for 9.8% of their SG&A expenses, exceeding total expenses for research and development in almost every instance.

Altogether, 55% of 3,475 major U.S. firms spent more on paperwork to comply with federal regulations than they paid in taxes in 1994, which amounts to a 59% tax surcharge.

My database includes information about more than 600 corporate IT budgets and how they relate to corporate overhead. A dollar's worth of corporate administrative costs consumes anywhere from 15 cents to 25 cents of computer expenses. That suggests that about $30 billion of computer processing is required just for reporting to the federal government for the 600 major corporations. That amounts to about 10% of all IT budgets — computer time for work that creates no economic value added.

I have no data on comparable expenses for compliance with state and local governments, but processing their demands is likely to represent a noticeable addition on top of federal requirements.

### IMPLICATIONS FOR CIOs

- These findings illuminate some of the causes of the computer paradox. Corporate overhead costs rose 42% from 1988 through 1994 and grew faster than revenues or profits despite a 67% rise in computer expenditures. Government-dictated paperwork diminishes productivity gains realized in the delivery of improved performance to paying customers.

  No one should expect increased profits from computerization if government requirements increase the number of inspectors, clerks, administrators and auditors disproportionately.
- Information management chiefs should become spokesmen about the impact of government paperwork burdens. Despite Washington's frequent claims about reducing corporate paperwork, the only way this can be clearly demonstrated is by displaying, at budget time, the firm's costs of handling government paperwork. CIOs should reveal what the paperwork does to their firms' profits. ■

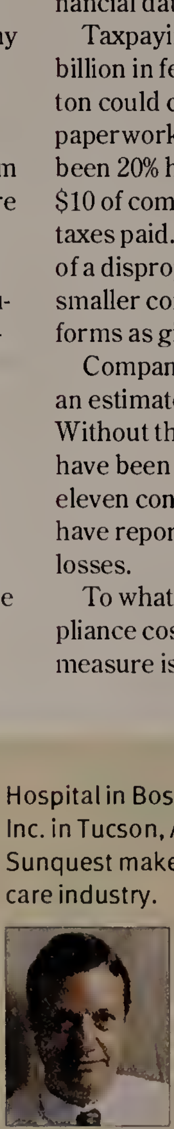
Strassmann (www.strassmann.com), a CIO for more than 30 years, had to learn how to explain billions of dollars in IT spending.

## F.Y.I.

### Executive Track

**Gregory M. Benson Jr.** was named chief information officer of the Philadelphia school district. He had been assistant vice president for educational technology at Empire State College of the State University of New York system.

**S. A. "Sam" Miller**, former CIO at Massachusetts General Hospital in Boston, joined Sunquest Information Systems, Inc. in Tucson, Ariz., as vice president of strategic planning. Sunquest makes clinical information systems for the health care industry.



**Jamie Bullen** was named vice president and CIO at WinStar Telecommunications, a competitive local exchange carrier and subsidiary of WinStar Communications, Inc. in New York.

**Ian Scott** retired as director of information technology services at the World Bank in Washington and was replaced by **Mohamed Muhsin**. Scott will stay on as a senior adviser of information management.

Share, Inc., a nonprofit, voluntary association whose member organizations are broad-based users of IBM technology, recently elected four officers and two directors.

- **John Bevis** of the University of Florida was elected president. He had served as treasurer.
- **Kathy Mayberry** of Pennsylvania State University is the new vice president. **Dave Hanko** of the U.S. Department of Defense was elected secretary, and **Ron Thielen** of the University of Chicago will serve as treasurer.
- **Lillian Cooper** of AlliedSignal, Inc. and **Harold Pritchett** of the University of Georgia were electedto the board of directors.

**Stephen Brown** was named CIO at Imation Corp. in Oakdale, Minn., an imaging and information company recently spun off from 3M. Brown, a 22-year IT veteran, most recently was vice president of information systems at Genmar Holdings in Minneapolis.

**Robert L. Gett**, former CIO at the investment house Smith Barney, Harris Upham, was named to the board of directors at Optika Imaging Systems, Inc., a maker of integrated imaging software in Colorado Springs.

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# Buyer's Guide

**By Alan Radding**

# IT MAY BE RISC CISC BOTH

**RISC servers** still have the advantage in scalability for demanding applications, but the Intel architecture is closing the gap

RISC vs. CISC, the Unix vendors against Intel Corp. It once was a portentous matchup that rivaled today's battle between Netscape Communications Corp. and Microsoft Corp. in intensity and hype. Today, "the particular chip matters a lot less," says Jon Oltsik, an analyst at Forrester Research, Inc. in Cambridge, Mass. Information systems managers are more likely to base a systems choice on the software and operating system. But chip architecture still matters in areas such as scalability for demanding applications, where RISC still has an advantage.

The server chip issues today are a lot more fuzzy than before. *Computerworld* asked some industry analysts to help clarify the issues and ease buying decisions for IS managers. "A couple of years ago, you bought Intel because of the price, or RISC for the performance. Today, Intel has closed the performance gap," says Jim Garden, director of syndicated services at Technology Business Research, Inc. in Hampton, N.H. As a result, buyers should focus on application software and the operating system, he says. They should pay less attention to the raw chip speed.

### Two approaches

Reduced instruction set computing (RISC) represents an approach to computer processing that takes advantage of the 80/20 rule, in which 80% of the processing done by the central processor uses only a subset of the chip's total instruction set. RISC chip designers took this smaller, simpler instruction set and combined it with technologies such as pipelining that enable the chip to process multiple instructions in one processing cycle. The result is a chip that performs better for most applications and theoretically costs less, because it is smaller and cheaper to make.

The major RISC vendors include Hewlett-Packard Co. (PA-RISC), Sun Microsystems Computer Corp. (SPARC), Digital Equipment Corp. (Alpha), Silicon Graphics, Inc.'s MIPS unit (R10000) and the combination of IBM and Motorola, Inc. (PowerPC).

It may be . . . , *page 98*

# It may be ...

CONTINUED FROM PAGE 97

Intel's Pentium and Pentium Pro families, by contrast, continue with the more conventional complex instruction set computing (CISC) approach. CISC chips incorporate hundreds more instructions than RISC chips and have more ways to address memory — eight to 12 ways vs. two to three ways for RISC. But the technical differences between RISC and CISC have blurred in recent years, especially concerning overall systems performance. Both RISC and CISC systems, for instance, generate similar transaction processing benchmark results of 5,000 to 8,000 transactions per minute, depending on the specifics of the configuration. For some types of transactions, CISC systems can beat RISC systems. That was unheard of two years ago.

"Each has stolen the good ideas from the other," says Dean McCarron, a principal at Mercury Research in Scottsdale, Ariz. RISC chips, once defined as having fewer than 128 instructions, now have as many as 200, compared with 300 or more for CISC. Today, CISC chips incorporate pipelining and superscalar techniques. Both camps rely on large caches to boost performance.

The underlying chip still plays a key role in server selection, but buyers are looking beyond the chip's technical architecture. They are focusing instead on related issues: application performance, scalability, cost, software availability, memory address space and subsystem design.

The following is a breakout of these categories, along with a look at each chip architecture and how it addresses these issues:

## Scalability

RISC once held a clear edge in scalability through support for symmetrical multiprocessing (SMP). For organizations that need midrange and large-scale, SMP servers, RISC-based systems remain the leading choice.

But the RISC advantage results more from the Unix operating system rather than anything inherent in the RISC processor design.

The issue for SMP systems comes down to how the operating system distributes work among multiple processors. In this area, Intel will have to wait for the operating system vendors to catch up. RISC/Unix currently has the advantage.

With Microsoft's Windows NT operating system, commodity CISC/Intel servers can support four processors easily and can even go to six processors for low-end SMP, Garden says. At the massively parallel high end, where the operating system is customized for the hardware architecture anyway, NCR Corp., Data General Corp., Unisys Corp., Sequent Computer Systems, Inc. and others offer large Intel-based parallel processing servers that run various vendor implementations of Unix, says Jonathan Eunice, an analyst at Illuminata, Inc. in Nashua, N.H. Intel-based parallel processing servers have dozens and even hundreds of processors. "Scalability is no longer a CISC/Intel limitation," he says. The choice for scalability revolves around how you want to scale. CISC is the likely choice if you want to move into complex massively parallel systems that have dozens, if not hundreds, of processors. But in less-complicated SMP systems, RISC is preferred once you go beyond four to six processors.

HP's HP 9000 Enterprise Server family is based on HP's PA-RISC architecture

## Application performance

The performance difference between RISC and CISC today is most evident in floating-point calculations, where the chip must handle mathematically intensive activities. "In terms of floating-point performance, RISC still holds about a 20% advantage," Garden says. Applications that benefit from RISC's floating-point performance include financial trading systems or complex engineering applications.

But most business server applications don't benefit from floating-point performance. They need integer performance. "An Intel Pentium processor delivers very competitive integer performance," says Rich Partridge, a research analyst at D. H. Brown Associates, Inc. in Port Chester, N.Y. Integer calculations deal with whole numbers, which require fewer bits to represent each number. They therefore require less processing. Most business applications, such as those that track the number of products ordered or calculate the amount of inventory in a warehouse, use mainly integer calculations.

Chip performance is less of an issue in multiprocessor systems. When you combine multiple processors in a business server, the biggest factors in performance are the way the system distributes work among the processors and how the system resolves bottlenecks — not the speed of the individual processors. The choice of chip in this area comes down to the nature of your applications. If they are predominantly integer-oriented, CISC is preferred. If you have a lot of applications that require extensive floating-point calculations, RISC remains your best bet.

Digital promotes the AlphaServer 4100 RISC-based system for decision-support applications

## Cost (price/performance)

In the chip business, cost is more a factor of volume than technology. For example, the Apple Computer, Inc./IBM/Motorola venture was intended to achieve Intel-like economies of scale with the RISC PowerPC chip. The volume just hasn't materialized so the PowerPC remains expensive compared with the Intel chip.

The real question becomes future product viability, not price/performance. "The PowerPC has fallen behind on the price/performance curve. It is getting late for them," Eunice says.

Garden says, "I'm not sure there is enough volume to justify continuing this much longer. If Apple adopts the Intel processor, it's the end for the PowerPC." Those who buy PowerPC servers need to assure themselves that the vendor and the chip will remain viable for the expected life of the product.

Meanwhile, Intel continues to leverage massive volumes to push processor performance to commodity price levels and boost performance. In the cost category, Intel wins hands down. Organizations that seek the best price/performance for low-end and midrange general business serving will opt for CISC/Intel. The only organizations in this market segment that will opt for RISC are those that need floating-point performance or greater SMP scalability, where RISC is strong; or those that simply prefer the RISC implementations of Unix.

**It may be . . .**, *page 102*

## The bottom line

**Use RISC/Unix for high-speed, compute-intensive serving, for the 64-bit memory address space and for SMP scalability. High-end massively parallel systems, on the other hand, are moving to CISC/Intel. For the midrange, the choice is RISC or CISC running Unix or Windows NT. The low end belongs to Intel.**

**From a practical standpoint, most users will choose the operating system, Unix or NT, with which they are comfortable and the particular dialect of Unix they have used in the past, Partridge says. With those decisions made, the chip selection falls neatly into place.**

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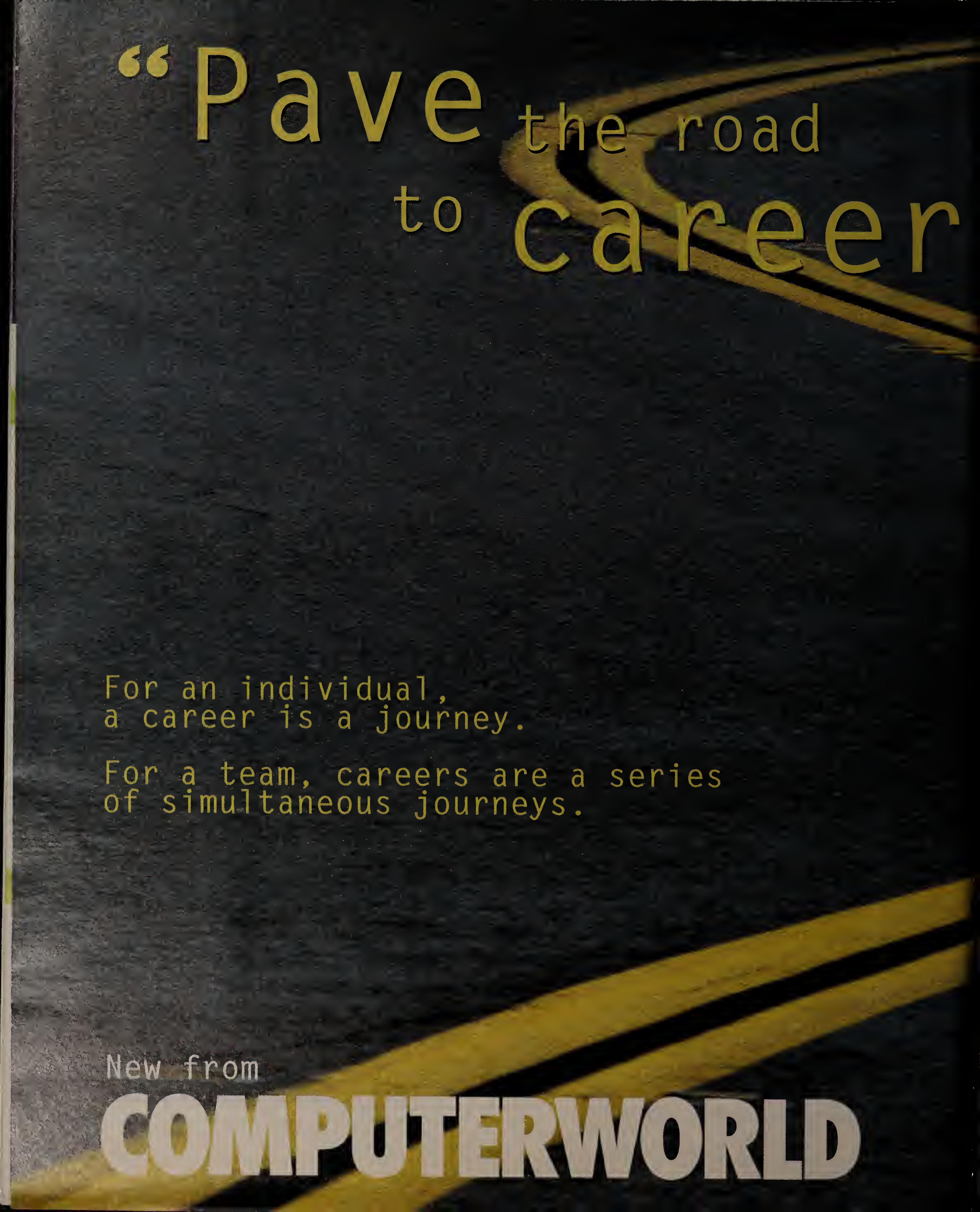

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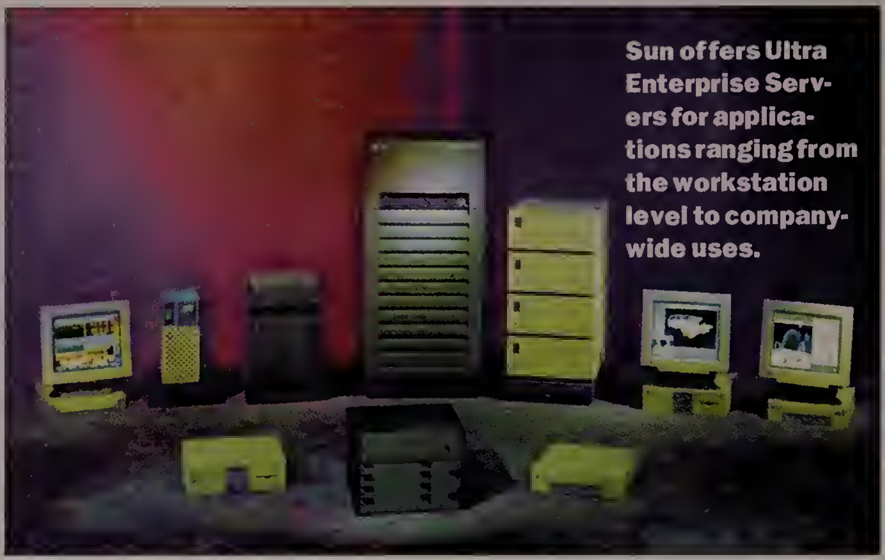

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*The five leading RISC systems vendors by market share, according to International Data Corp. (listed in alphabetical order):*

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www.hp.com
**Product lines:** HP 9000 series (based on HP-UX) and HP 3000 series (HP MPX/IX operating system)

**IBM**
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www.ibm.com
**Product lines:** RS/6000 (IBM AIX) and AS/400 Advanced (based on OS/400)

**Silicon Graphics, Inc.**
*Mountain View, Calif.*
(800) 800-7441
www.sgi.com
**Product lines:** Origin, Challenge, Power Challenge (based on SGI Irix)

**Sun Microsystems Computer Corp.**
*Mountain View, Calif.*
(800) 821-4643
www.sun.com
**Product lines:** Sun SPARCserver family (based on Sun Solaris)

> *"You can have the best processor, but if the subsystems don't cooperate, you'll have problems."*
>
> *Dean McCarron*
> *Mercury Research*

## Subsystem design

Today's business server is a complex system of many interrelated parts. The processor is just one such part and not necessarily the most important. In a business serving environment, disk I/O, memory, cache and the communications bus and switches all play key roles, as do the operating system, middleware and database management system. When multiple processors are used, the design and implementation of these subsystems is critical to remove bottlenecks that can offset any CPU performance advantages.

"You really need to look at all the components, not just the processor. You can have the best processor, but if subsystems don't cooperate, you'll have problems," McCarron says. Screaming floating-point performance won't help if I/O is slow.

With the Pentium Pro, Intel offers vendors not only processors, but entire four-processor SMP subsystems. Using these subsystems as common building blocks, vendors are starting to produce SMP business servers based on Pentium Pro chips at commodity prices at the low end.

"The quality of the integration is comparable among RISC and CISC systems. The only real difference is cost. There are many more Intel vendors, and the costs are much lower," Eunice says. At the high end, the architecture and subsystem integration become significant differentiators among systems vendors.

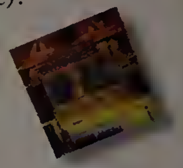
## Software availability

Choose your application software first. That will help you make the decision about the operating system. Then choose the platform on which to run it," Eunice advises.

By following that advice, "you'll most likely go with RISC if you choose Unix as your operating system," Oltsik says, because that is where the major Unix vendors are. The leading Unix systems vendors — Sun (Solaris), HP (HP-UX) and IBM (AIX) — all use RISC processors. If you choose Windows NT, you have a choice of processors, Intel or Digital's Alpha. "But 90% of the NT servers go out on Intel," he says. Those NT buyers who choose the Alpha RISC processor usually run compute-intensive applications. "When Windows NT started to ramp up in 1994, it muddied the processor choice," Eunice says. Major application vendors such as SAP AG are porting their products to Windows NT, which elevates CISC/Intel as a general purpose midrange business server.

## Memory address space

With the rise in data warehousing and data mining, the choice between RISC or CISC may come down to 64-bit processing, which currently requires RISC. CISC processors are 32-bit, but Intel reports that a 64-bit processor is under development, although it is still off in the future. The choice between RISC and CISC depends on how much memory you need to address. A 64-bit processor addresses 16 exabytes of memory (an exabyte is four orders of 1,000 greater than a megabyte).



In comparison, 32-bit chips address 4G bytes of memory. Intel squeezes a 64G-byte address space out of its chip using nonstandard extensions of the chip architecture, but the operating systems that run on Intel can't yet address anywhere near that. Even the biggest 64-bit RISC systems generally provide only 10G to 12G bytes of memory, Eunice says.

If you are running complex database applications or data mining, the 64-bit address space and 64-bit data path can provide a significant performance advantage. "Sixty-four-bit processors allow you to use more memory, making data 100 times faster to access," Oltsik explains.

Adding gigabytes of memory onto a RISC system results in a pricy server, but for a critical application that needs a hundredfold performance boost, there may be no better options. ■

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Radding is a freelance writer in Newton, Mass.

## What the future holds

- **Most RISC chips will be 64 bits**
- **No CISC/Intel 64-bit chip for 18 to 24 months**
- **CISC/Intel will continue to set the price/performance trend**
- **RISC will focus on high-end performance**
- **The PowerPC will be tailored and enhanced for the high end, which will lead to a variety of customized PowerPC variants**
- **Incremental increases in chip performance due to solid engineering improvements that exploit current technology, but no major performance breakthroughs**

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# Rooms Fo

**Hotels are using technology to pamper business travelers. We sent two reporters to opposite ends of the country to see if progress is being made. Results were mixed – but at least you can plug in your modem these days.**

*Kim Girard,* Computerworld*'s staff writer for telecommunications, trekked to New York to see how the RIHGA Royal is enticing high-tech travelers.*

As Frank A. Banks, general manager at midtown Manhattan's RIHGA Royal Hotel, traveled around the world over the years, he tracked what irked or pleased him about hotel stays.

A steamer to help coax wrinkles out of a suit was a nice touch, he found. But a telephone on a nightstand was his nemesis.

"I'm on the corner of my bed holding a phone, and there's a nice desk, and I can't sit at it," Banks recalled during a recent interview at his office.

When it came time for Banks to market the RIHGA's 500 suites in 1990, he says he thought he was ready to create the ultimate for a traveling executive: the hassle-free business stay. His motto? Performance above pretense.

"People expect more," Banks says. "It's not enough to have a pretty room with nice soaps."

Willing to put Banks' hassle-free promise to the test, I recently packed my laptop and embarked on a one-night mission at the RIHGA on West 54th Street.

After several trips spent contorted on hotel beds with laptop cords tangled around my torso while drinking bad coffee, I was ready to be pampered.

My RIHGA, or Royal International Hotel Associates, experience begins immediately after I step off the shuttle at La Guardia Airport. I spot a driver holding a sign with my name on it and follow him toward a black stretch limousine waiting at the curb. Bruce Springsteen must have been on the plane, I thought. But no, the Lincoln Town Car fetches all RIHGA Pinnacle Suite customers — mostly top business executives — who pay $500 a night for the privilege of staying in the best rooms. The car also spares them the hassle of hailing a cab or ordering a car to pick them up.

Twenty minutes later, we pull up to the busy, elegant hotel. It was built six years ago by an Osaka, Japan-based hotel company in a former parking lot between Avenue of Americas and Seventh Avenue.

I quickly check in, scan the area for a rock star and follow Pinnacle Manager Erin Beatty-Spiegel to my one-bedroom suite. Soft classical music from a Panasonic Co. stereo/CD system greets us as we enter. Lodged in a cabinet under the stereo is an Alphanet IBC 4000 fax machine, which doubles as a copier and printer that I can use with my laptop. Beatty-Spiegel offers me a Motorola, Inc. cellular phone, which automatically rings within 90 miles of the hotel if I don't pick up on the private line in the room. (You can get a call in the 21 Restaurant, Banks says.) I also get business cards, embossed with my name, room fax and private phone numbers at the RIHGA. Impressive.

When I pull out my laptop, I am ready for the true test. The beauty of a hotel, to a business traveler, can be as simple as a well-placed telephone with a sturdy data port.

The two-line telephone here is set on a large, marble-topped desk. (There are others in the bedroom and in the bathroom). An electrical socket on my left isn't covered by furniture, so no crawling behind the bed is required. I'm sitting in a comfortable high-back chair enjoying a view of Central Park. My computer is working well. I don't lose a modem connection while working for over an hour. I do a phone interview without turning off my computer.

Several T1 lines to the hotel were installed three years ago to provide needed bandwidth. A technical supervisor is on call 24 hours to help with computer or equipment problems. Intel Corp. videoconferencing equipment is available in a banquet room. The hotel is working on a billing system and a plan to offer direct Internet access to guests in their suites.

"We're always looking for new technologies," Controller John Quirke says. "As soon as a new type of technology comes, our guests want to try it."

Banks says he has designed the hotel like an airplane, offering first class (Pinnacle Suites, $500), second class (Imperial Suites, $425) and coach (Royal Suites, $350). He says 95% of the hotel's guests are business travelers, and all of the rooms are supplied with some business-related amenities.

Banks introduced 20 Pinnacle Suites in 1992, upgrading regular suites at a cost of $25,000 per room. The number of suites has since grown to 80.

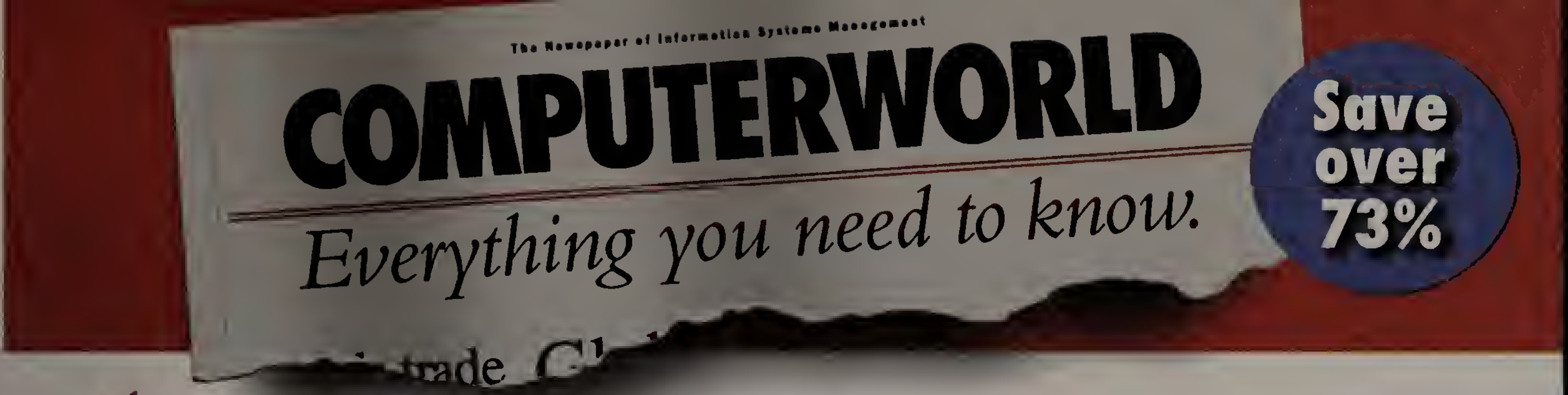
"At first, [we offered] just fax machines," he says. "Then we added the fax/print/copier and the Town Car service."

The hotel's occupancy rate rocketed from 10% in 1991 to 85% in the past three years, growth that Banks credits to word of mouth rather than advertising.

"People love the suites," Banks says. "Everything goes together in order to keep the person in the right frame of mind."

I appreciated the RIHGA more when I contrasted the experience with that of a $200-a-night Manhattan hotel just blocks from the RIHGA. Posters on the walls there promised to keep business travelers happy. All I got was a ratty, broken telephone line that left me tearing my hair out, struggling with a deadline and no modem connectivity. Harried personnel let me temporarily use another room with a working phone to edit an article. When I moved back to the original room, my phone line wasn't just scratchy but completely dead. That night, I dreamt of the RIHGA. ■

**General Manager Frank Banks in a RIHGA Royal suite. The hotel's occupancy rates took off after Banks upgra ed suites (at a cost of up to $25,000 each) with an eye toward business travelers.**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   - 41. Engineering, Scientific, R&D, Tech. Management
   - 60. Sys. Integrators/VARs/Consulting Mgt.

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   - 12. Vice President, Asst. VP
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   - (h) NeXTstep

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   Networking Products ☐ Yes ☐ No

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| D. 1,000 – 4,999 | ☐ | ☐ |
| E. 500 – 999 | ☐ | ☐ |
| F. 100 – 499 | ☐ | ☐ |
| G. 50 – 99 | ☐ | ☐ |
| H. 20 – 49 | ☐ | ☐ |
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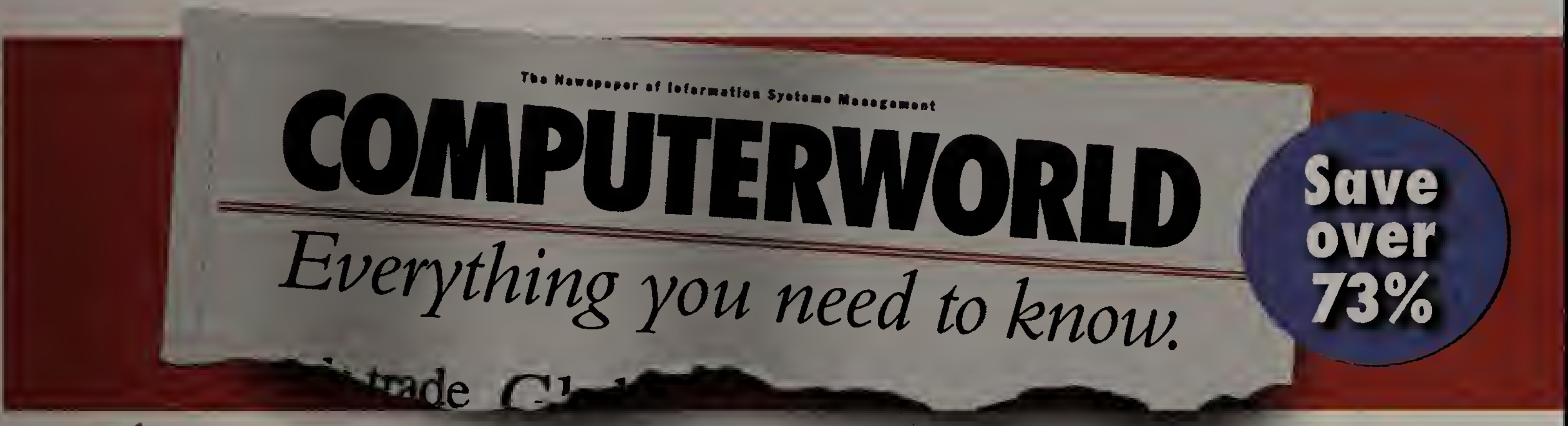
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   - 85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
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   - 23. Dir./Mgr. Sys. Development, Systems Architecture
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   - (g) Windows
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# Improvement

*Justin Hibbard,* Computerworld*'s online reporter who focuses on desktop hardware and software, checked in on the West Coast approach to modern hospitality.*

Los Angeles is the city of the future, where workers telecommute when there's a smog alert and everyone is just a cellular-telephone call away. It's also the city where a good publicist is more important than a good business plan.

It isn't surprising, then, that one of the city's premier hotels has created a high-tech suite that is part visionary, part bombast. The Century Plaza Hotel and Tower this summer introduced the Cyber Suite, which includes everything wired executives need for work and more than they could ever imagine for play.

The Century Plaza may, in fact, be the only hotel that has gone too far in its efforts to accommodate business travelers' technological needs. The office equipment and communications services are superb, but they are lost in a whirl of toys so new that manufacturers haven't yet figured out how they work.

I spent one night in the Cyber Suite, hardly enough time to use all its features. When I arrive, Frank Wasmer, the hotel's director of engineering and the mastermind behind the suite, gives me a tour.

Wasmer begins by introducing me to Alexander, a set of blinking diodes mounted in a brass panel on the wall. This voice-controlled "butler," made by Automated Voice Systems, Inc. in Yorba Linda, Calif., controls devices in the suite by transmitting the X10 communications protocol through infrared signals and the hotel's electrical system.

"Alexander," Wasmer says.

A smarmy Englishman's voice answers. "May I help you?"

"Party time," Wasmer says. The lights dim, a dance tune blares from the Bang & Olufsen six-CD changer, and the curtains sweep open, revealing three picture windows overlooking Los Angeles' west side.

"Alexander," Wasmer says, "romance." The lights drop to candlelight level, the CD player switches to a sultry selection, and the curtains close.

I am ready to see the office equipment, but before I can speak, Wasmer whisks me over to a Panasonic Co. laser-disc player connected to a flat-screen television from Science Applications International Corp. in San Diego. The TV is a prototype, he says, and cost $10,000. Someday, all hotel rooms will have flat-panel display TVs because they save space, Wasmer says. He also has a Nokia Corp. smart phone and a Eastman Kodak Co. digital camera there in case I want to play with them.

Next, we make our way to the NetTV, also a prototype, made by NetTV, Inc. in San Rafael, Calif. We watch 12 different TV channels at once on the machine, which is connected to a Micron Co. P166 PC loaded with communications software. We surf the World Wide Web on an Integrated Services Digital Network line connected to Internet service provider Netcom On-Line Communications Services, Inc.

"When Newt Gingrich came through here, he said, 'I use [Internet service provider] Interramp. You guys should get Interramp,'" Wasmer says.

Had we wanted to videoconference with Rep. Gingrich, a digital video camera and phone would have transmitted our images and voices to Capitol Hill through VDOLive's VDONet software.

At this point, I had to ask. "What if you just want to do some work?"

Wasmer looks surprised. He leads me into the bedroom where there is a desk with a phone. The phone has a data port, two lines and voice mail. There is an extra phone jack in the wall. In the opposite corner, a Panasonic all-in-one printer/copier/scanner/fax machine awaits my commands.

Another Micron P166 is connected to the Panasonic device and a Panasonic 32-in. TV. Microsoft Corp.'s Office is loaded on both Micron PCs, which lets guests give Microsoft's PowerPoint presentations on either TV using Gyration, Inc.'s wireless GyroMouse.

"I tried to come up with systems as opposed to gadgets," Wasmer says. The most challenging system was the butler, he says, because many machines wouldn't interoperate with Alexander because of their proprietary designs.

Our discussion leads to a demonstration of Forte Technologies, Inc.'s virtual reality goggles, another prototype.

That night, I decide to test the suite's equipment to see if the average guest could use it without Wasmer's assistance. To keep everything objective, I call in an independent third party: my friend Adam, who works with computers but isn't in the industry. We try to videoconference with VDONet and fail, so we switch to the virtual reality goggles and fail with them as well.

I call the night manager, who was trained in supporting the Cyber Suite. She comes to our rescue and fixes everything in about 15 minutes. After she leaves, we decide the test is over, and Adam goes home. I open a drawer and wedged between copies of "Doom" and "Dark Forces," I see a leatherbound Bible. I turn off the lights manually, except for a bedside lamp, and read Ecclesiastes in bed. ■

**A guest surfs in style. The Century Plaza has endowed its Cyber Suite with every gizmo a traveler could ever use – and then some.**

# Computer Careers

## PARTY HARDY

With three Democratic National Conventions under his IS belt, Fitzroy Williams figures he's ready for anything

*By Alan R. Earls*

It was said by Charles de Gaulle that "Politics is too important to be left to the politicians." Perhaps he had someone in information systems in mind — say, someone like Fitzroy Williams.

As the information technology wizard behind the 1996 Democratic National Convention in Chicago, Williams made sure the event went off without so much as a tiny glitch in software or a dropped cellular telephone connection. And without his up-to-the-minute technical support, President Clinton and Vice President Al Gore might have come off looking like, well... donkeys.

A Democrat himself, Williams says he didn't pay much attention to politics until 1988, when he began his rise to prominence in the quadrennial convention business.

That year, with the convention being held in Atlanta, Williams took a leave of absence from his job as a senior software engineer at Scientific Atlanta, Inc. in nearby Norcross, Ga. His new assignment: Implement credential-checking software crucial to security and the voting of delegations.

Intrigued by the experience, Williams reprised that role in 1992 at the convention in New York, where he took on additional responsibilities.

Williams says the excitement was habit-forming. So, for this year, having two conventions under his belt and growing technical know-how in his own career, Williams was given the whole ball of wax. And, he says, he was ready.

"For someone who had never wanted to be in management, the hands-on work of the previous conventions set the stage," Williams says.

Williams brought to the job software skills ranging from Fortran to the latest techniques in PowerBuilder and Visual C++. He gained experience in project management, customer relations and knowledge of electronics while at Scientific Atlanta. He is IBM-certified in computer maintenance and Novell-trained in network design and systems administration.

Fortunately, says Roger Schneider, Williams' 1992 convention boss, that mixture of solid hands-on technical knowledge was combined with an unflappable disposition and a gift for making quick decisions.

At the peak of this year's convention, Williams had to oversee the work of nearly 400 technicians installing everything from phone and data lines to computers, copiers and virtually every other appurtenance of modern business. The challenges were numerous, varied and sometimes unexpected.

For example, to accommodate the unprecedented number of cellular telephones expected at the convention, Williams had to make sure the United Center was equipped with its own microcells. Otherwise, all the phones in use would have gone into higher power mode to seek more distant available cells, which could have interfered with broadcasting equipment.

Then there were the details of working with the Secret Service's technical group, monitoring and managing the use of radio frequencies inside the hall by conventiongoers, officials and media.

After apparent technical glitches appeared in the Republican convention, the pressure was on to make sure everything was perfect, Williams recalls. All in all, it was more than enough to ensure that Williams awoke in a cold sweat with some regularity as the convention neared.

Sonny Williams

**Fitzroy Williams** *says the Democratic Convention's IS operations were flawless*

The final two weeks were the worst — "very scary," Williams says. With delegates and officials arriving by the hundreds from across the nation, managing expectations and engendering confidence — no matter how challenging the situation — was critical.

As it turned out, everything went exactly as planned. "We couldn't believe it," Williams admits. "We were joking about being the Maytag repairmen."

With the convention behind him, Williams is taking his battle-tested project management skills into a consulting practice. He also is continuing to run his own small medical and church software business — ComfortWare Solutions, Inc. in Norcross.

And, he says, he'll be back for the convention in 2000, if asked.

For any deadline-sensitive project, the key is hiring the right people, Williams says. "The tendency is to bring on people who are your friends or friends of friends, because you need them right away. But you must make the effort to locate individuals with exactly the right skills and attitude." ■

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Earls is a freelance writer in Franklin, Mass.

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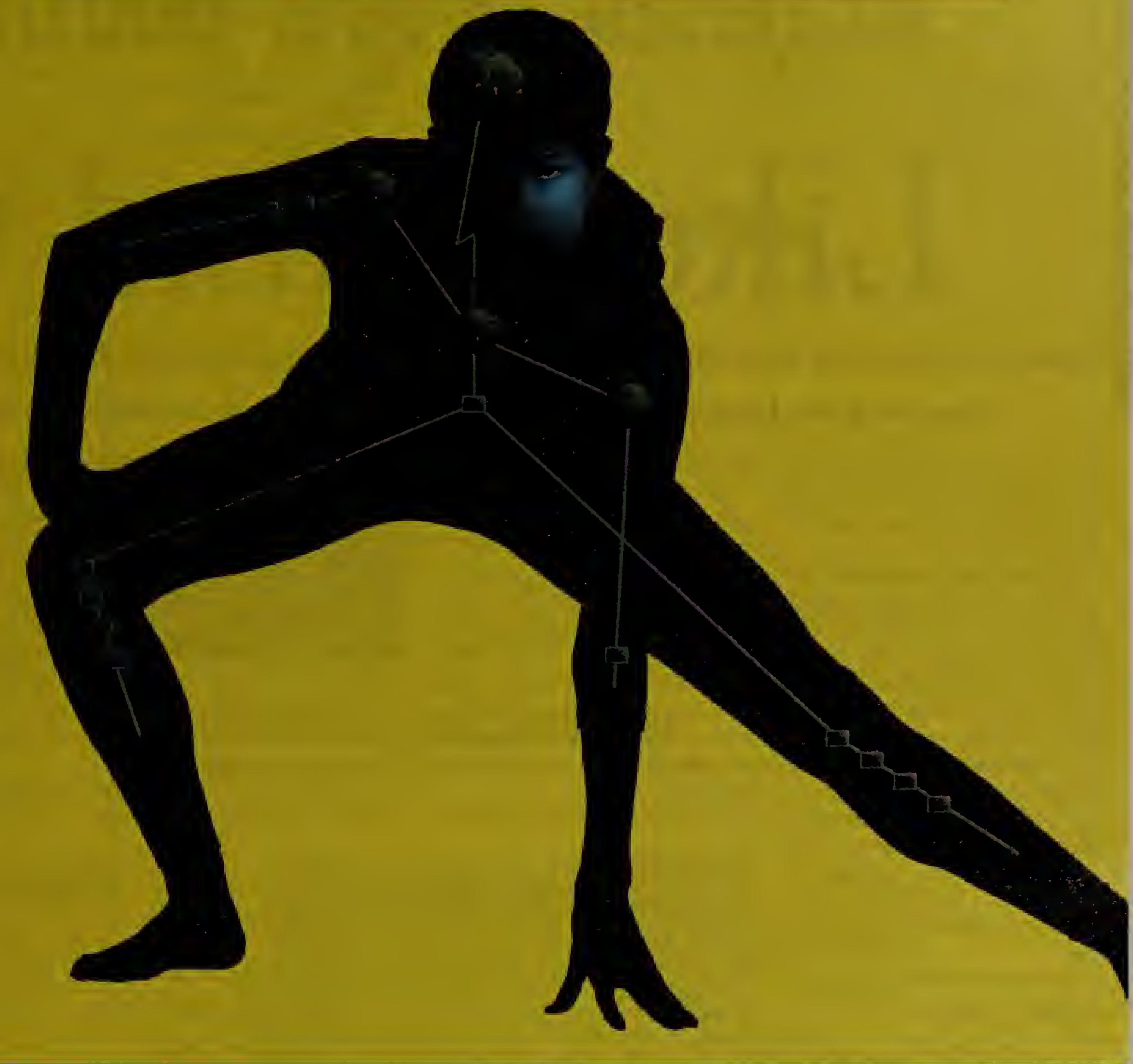

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# Regional Scope: Southern Texas

# Like oil and water

**Austin, Houston and San Antonio couldn't be more different. Even the IS opportunities in the three major metropolitan areas along the Lone Star State's southern corridor vary as widely as each city's identity. / *By Leslie Goff***

Texas' capital, Austin, is emerging as a high-technology hub akin to Silicon Valley or Greater Boston's Route 128 area.

The city and surrounding area boast a fair share of entrenched players such as Motorola, Inc. and IBM. But the home to the computer company that conducted its first business transactions from the trunk of Michael Dell's car exudes an entrepreneurial atmosphere.

For information systems professionals who are willing to take lower salaries in exchange for stock options and start-up opportunities, the "Silicon Hills" are fertile.

Houston, with its long history as an oil and gas town, is diversifying. Compaq Computer Corp.'s presence has had a significant impact on the area, and a major health care complex is spawning a plethora of ancillary services companies. With increasing competition in health care spurring an industrywide migration to client/server systems, the city most people associate with shimmering skyscrapers and AstroTurf has become a boomtown for IS professionals with cutting-edge skill sets.

San Antonio, best known for the Alamo, River Walk and great TexMex food, is the tightest of the three markets. Unemployment is relatively low, but hiring is flat. Of the city's 10 largest employers, eight employ fewer than 5,000 people. The job search for an IS professional relocating to the area could take as long as six months, recruiters say.

**Austin**

"Austin is where everyone in Texas wants to live," says Mike Posey, president of Resource Strategies, Inc., an IS recruiter in Houston.

Unlike much of the state, Austin is hilly, green and lush. As home to the University of Texas, the city retains a relaxed college-town ambience amid the high-tech start-up frenzy.

"It's the best of both worlds," says Jonathan Hines, chief recruiter for the Southwest region at Pencom Systems, Inc., a national IS recruitment firm. "Austin is saturated with IS opportunities, but you don't have to sacrifice your quality of life when you come here because the cost of living is more economical than in competing cities like Boston, Seattle or San Jose."

Hines says Pencom has 100 to 300 openings on any given day. Most of those are with software, hardware or IS services companies such as systems integrators and outsourcing firms. Database developers, Windows NT engineers and C++ programmers are most in demand. For IS professionals who want to move from traditional internal IS to product development or from end-user support to external-customer support, a move to Austin can generate new career possibilities.

**Houston:** *IS consulting and contracting are booming here*

**Houston**

"The economy is still oil-based, but not to the extent that it was eight to 10 years ago," Posey says. "It's a much more diversified market, and that in and of itself supports continued growth. The market is as healthy as it was in the late '70s, when we were really into the oil boom."

Information systems consulting and contracting are at an all-time high in Houston, Posey says, with companies chasing down IS professionals of all flavors, from object-oriented programmers to strategic business process reengineering consultants.

Visual Basic and C++ programmers, Unix system administrators, database management system analysts and administrators and SAP consultants are in high demand.

"I don't think it would take someone with the right skill sets more than a month to six weeks — at the most — to find a job here," says David Taylor, a human resources manager who specializes in IS recruiting at the University of Texas-N.D. Anderson Cancer Center. The center has 220 IS employees.

**San Antonio**

"Only a handful of employers were staffing in 1996, and based on past trends, we do not anticipate that will change for 1997," Hines says.

Unemployment, 5.1% in August, is below the national average, but the city seems to have very little churn. "San Antonio boasts [a low] cost of living and a pleasant environment. Most of the people we deal with there want to stay and are not willing to relocate," Hines says.

Insurance firm United Service Automobile Association is the largest civilian employer, but with SBC Communications preparing to move its headquarters to town from St. Louis, that may change. The military is another large employer in the area. ■

---

Goff is a freelance writer in New York.

## Top employers

(by number of employees)

### ★ AUSTIN

| | |
|---|---|
| University of Texas | 19,000 |
| Motorola | 11,000 |
| Austin Independent School District | 8,400 |
| City of Austin | 8,000 |
| IBM | 7,800 |

Source: Austin Chamber of Commerce
www.ci.austin.tx.us/growth/gwmajemp.htm/

### ★ HOUSTON

| | |
|---|---|
| Brown & Root | 17,000 |
| Kroger | 12,000 |
| Continental Airlines | 11,500 |
| Randall's Food Markets | 11,000 |
| Shell Oil | 10,000 |

Source: Houston Chamber of Commerce
www.houston.org/business/employ.html/

### ★ SAN ANTONIO

| | |
|---|---|
| United Service Automobile Association | 11,518 |
| H.E.B. Food Stores | 10,042 |
| West Telemarketing | 4,050 |
| Taco Cabana | 4,000 |
| Southwestern Bell Telephone | 3,871 |

Source: Information provided online by the city of San Antonio

## Employment rates

| | |
|---|---|
| Austin | 3.3% |
| Houston | 5.7% |
| San Antonio | 5.1% |
| Texas | 6% |
| U.S. | 5.6% |

Source: August 1996 Texas Workforce Commission

## Online resources

### ★ AUSTIN

*City of Austin*
www.visit.ci.austin.tx.us/

*Austin 360*
www.austin360.com/

*Austin Relocation Network*
www.chataqua.com/ARN/ARNSC/ARNSCAustin/ARNAustin.html/

### ★ HOUSTON

*The Heartbeat of Houston*
www.comp2000.com/houston/

*The Houston Billboard*
www.cyber-sites.com/billboard/

*The Houston Online Network*
www.houstonnet.com/index-g.htm

### ★ SAN ANTONIO

*San Antonio Showcase*
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**Opportunities in the Boston, MA area include:**

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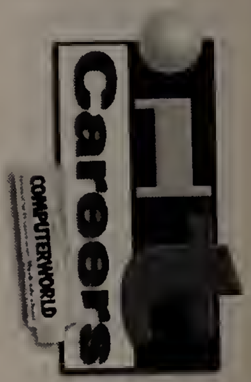

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**CM Specialist**
Provide CM planning and support. **Requires:** BSCS or equivalent technical degree, experience with version control, team development management, audit trail and management reporting, object browsers, client/server, distribution systems, policy and procedure development and change management processes.

**Telecommunications Specialist**
Design strategy for LAN/WAN networks. **Requires:** BS/MS in CS or Telecommunications; 7 years experience supporting large, multi-protocol networks; familiarity with OSI model, LAN/WAN design, ethernet/fast ethernet, ATM, FDDI, TCP/IP, SNMP, IBM Netview/6000, networking hardware, Windows NT and fiber optic cabling.

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Software Developer. Responsible for interfacing with other functional groups, such as assay development and marketing, to create functional requirements for a medical diagnostic analyzer in the area of data reduction, user interface and application areas. Responsible for creating and maintaining software requirements documents for object oriented software development. Responsibilities include software analysis using information models/Entity-Relationship models, design, coding using C/C++ programming language on Microsoft Windows, test cases/validation protocols development and system simulations. Responsible for creation of data reduction models and maintaining existing models requiring expertise in statistical techniques such as simple and multiple regression and tools. Responsible for developing and supporting off-line data reduction software including documentation updates, defect correction, software enhancements (addition of new data reduction models and reporting capabilities) and training of new user. Master's degree in Electrical Engineering required. Applicant must have academic experience with data reduction using multiple regression in a regression space using statistical tools, experience in C programming language and system simulations. Applicants must have completed one course in each of the following: Stochastic Systems, Knowledge Engineering, Principles of Detection Theory. 40 hours, 8:15 a.m. to 4:55 p.m., $46,240 per year. Must have proof of legal authority to work permanently in the U.S. Send resumes to ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY, 401 South State Street - 3 South, Chicago, Illinois 60605, Attention: Brenda Kelly, Reference V-IL-15605-K. NO CALLS. AN EMPLOYER PAID AD - SEND 2 COPIES OF RESUME & COVER LETTER.

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Computer Consultant/Programmer (Chicago): Analyze client business & financial management procedures. Analyze client information systems & identify any hardware, software & organizational problems. Design, develop, test, implement & participate in the quality assurance process for business systems software applications. Use the following hardware & software in formulating client solutions: IBM 3090 & IBM ES9000 hardware mainframes; IBM PC hardware; DOS operating systems, DB2 database & VSAM file management system; CICS user interface for on-line screens, MF Workbench software; APS case-tool; CSP, COBOL & COBOL II languages & MVS mainframe operating systems. 40hrs/wk; 8:30-5pm; $50,000/Yr. Must have Bachelor's in Computer Science & 2 yrs exp in job offered or 2 yrs exp as Programmer Analyst or Systems Analyst. Must have completed at least one college level course in each of the following areas: 1) Accounting & Financial Mgt; 2) Software Engr'g; & 3) Systems Information Concepts & Organization. Exp must include the design, development, testing & implementation of business system software applications using each of the following computer technologies: DB2, VSAM, CICS, MF Workbench, IBM 3090, MVS, COBOL II, APS & CSP. Must have proof of legal authority to work permanently in the US. Send resume/ltr in dupl to: Illinois Dept of Employment Security, 401 South State Street - 3 South, Chicago, IL 60605, Attn: Joan Sykstus, Ref# V-IL 15571-S. An employer paid Ad. No Calls.

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Software Engineer. Client sites & Co. location in Birmingham, AL. Analyze, design, develop software systems. Analyze requirements to determine feasibility of design. Confer w/technical staff regarding interface between hardware/software, operations & performance requirements. Utilize Smalltalk, Korn Shell, C++ & object methodologies. Requires Bachelor's degree in Computer Science, Math or Engineering plus 1yr/exp. in duties described above or 1yr/exp. as Programmer/Analyst. Exp. must incl. 1yr using Smalltalk; Korn Shell, C++ & object methodologies. Salary: $51,840/yr. Work 8am-5pm, 40hrs/wk. Applicants must be authorized to work in the U.S. Resumes to G. Minor, Alabama State Employment Service, P.O. Box 59482, Homewood, AL 35259-9482. Refer to Job Order #AL 6024639. E.E.O.

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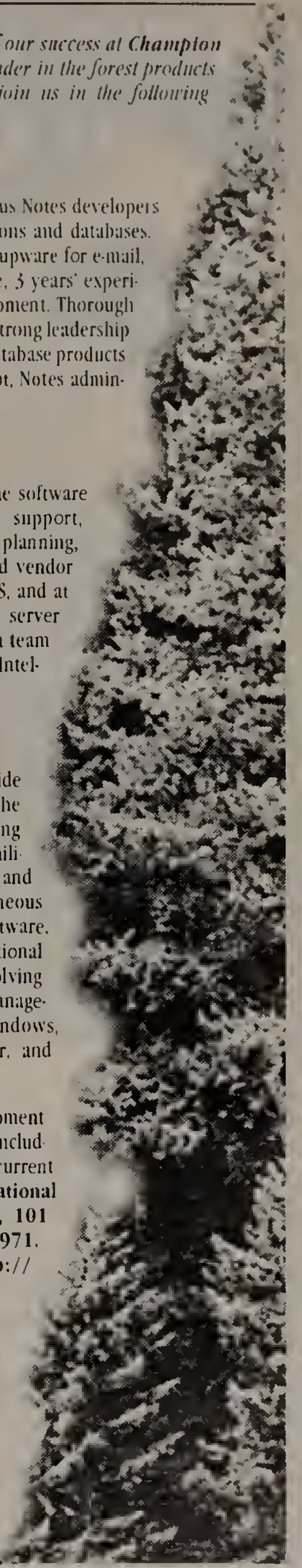

## Lotus Notes Developer

You will be responsible for providing application consulting to Lotus Notes developers throughout Champion and for developing general Notes applications and databases. Champion recently adopted Lotus Notes as our enterprise-wide groupware for e-mail, workflow, and discussion forums. Requires a 4-year college degree, 3 years' experience in IS, and at least 1 year of experience in Lotus Notes development. Thorough understanding of the Notes security model also essential, as well as strong leadership and problem-solving skills. Experience with PC programming and database products (e.g., Visual Basic, PowerBuilder, Microsoft Access, etc.), LotusScript, Notes administration, and workflow applications preferred.

## Lotus Notes Technical Analyst

Join our Lotus Notes Technical Support team as we implement the software throughout Champion. Responsibilities include second level support, configuration management, security, change management, capacity planning, performance tuning, problem management, disaster planning, and vendor contact. Requires a 4-year college degree, 3 years' experience in IS, and at least 1 year of experience in Lotus Notes administration. NT server knowledge, problem-solving skills, and proven ability to work in a team environment a must. Notes programming, LAN/WAN TCP/IP, and Intel-based server experience a plus.

## Data Warehouse Analysts

Several Data Warehouse Analysts are needed at Champion to provide project teams and end users with timely business data, manage the impact of change on users, support mill data analysts with consulting services, and implement a system management strategy. Responsibilities include developing models that identify major data subjects and sources, designing infrastructure for simple access across heterogeneous warehouse environments, and upgrading server hardware and software. Requires a Bachelor's degree and conceptual understanding of relational databases. Ability to lead in a team environment, strong problem-solving skills, and customer service focus also essential. 5 years of data management experience preferred, as well as familiarity with Windows, PowerBuilder, Impromptu, Powerplay, Oracle, DB2, SQL Server, and distributed database systems.

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Consultant. Design, develop, implement & test software for telecommunications systems. Write shell script. Communication interface design. Tools: PSOS/PSOS+; Probe; XRAY; Sablime; ECMS; LAN; TCP/IP; Openlook/X-Window; C; UNIX shell script; Digital Access Cross-Connect System (DACSII). M.S in Computer Science or Electrical Engineering as well as 1 yr exp. in job offered or as Systems Engineer required. Previous exp. must include: software for telecommunications including design of communication interfaces; C; UNIX. 40 hrs/wk, 9am-5pm, $45,000/yr. Must have proof of legal authority to work permanently in the U.S. Send resume to: Jeff Fang, Utek, Inc., 915 Harger Road, Ste. 350, Oak Brook, IL 60521. (630) 573-9888 REF# 111196.

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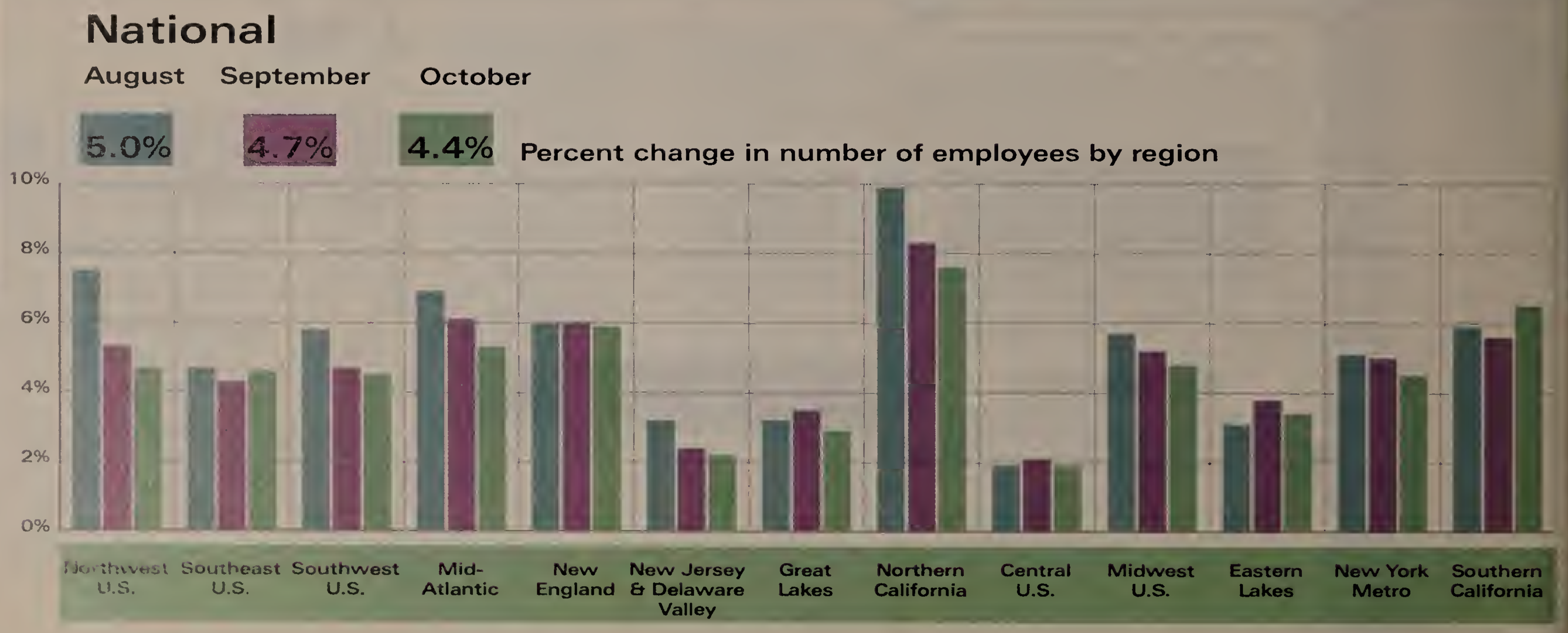

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# Marketplace

## Simplifying development

*That's the biggest plus of visual programming tools*

By Suruchi Mohan

Do visual programming tools make for better applications and happier end users? Yes. They simplify the overall development process, which creates not only a synergy between end users and developers but also empowers end users.

Visual programming tools let developers create applications using point-and-click and drag-and-drop techniques instead of text-oriented methods. Code is generated on behalf of developers, and visual techniques let them more easily organize development tasks.

The caveat is that these tools must be used with control and skill. Otherwise, it's like having "240 crayons vs. 120. Things become way too complex," says Richard Finkelstein, president of Performance Computing, Inc. in Chicago.

Simplifying the application development process is the biggest plus of visual programming tools. Those tools change the process from coding to dragging and dropping, says Mitch Kramer, consulting editor of "Application Development Practice," at Patricia Seybold Group in Boston. In the text-based world, the difference between textual and visual would be similar to that between character-based and graphical. Programming with visual tools is faster and requires fewer skills, less training and, eventually, lower salaries, he says.

But not all development tools are appropriate for all applications. Tools may be divided into those intended for the enterprise or for the workgroup, says Mike Merriman, research director at Gartner Group, Inc. in Burlington, Mass. Tools for the enterprise include Forte from Forte Software, Inc. and Dynasty from Dynasty Technologies, Inc. Well-known among workgroup tools are PowerBuilder from Sybase, Inc. and Visual Basic from Microsoft Corp. Oracle 2000 from Oracle Corp. and Progress from Progress Software, Inc. span the gap between the high and low ends.

Whichever tool is used, for end users it means greater involvement in a process that will, on completion, affect them the most. "Making a programmer come in contact with end users wouldn't be half as easy without visual programming tools," says Wayne Kernochan, vice president of commercial systems research at Aberdeen Group, Inc. in Boston. Programmers can prototype, come back with a screen and ask users for input.

That's nearly impossible with third-generation language programming code, where everything essentially is done before the user can be shown how the application looks and behaves.

In the much-hyped World Wide Web universe, too, visual programming tools will empower end users, Merriman said. Over time, as Web applications become a necessary component in enterprise development, users will expect more from developers in terms of support.

The Web has brought developers and end users closer, Kernochan says. Netscape Communications Corp., for example, is driving its development effort off the Internet. The company puts beta software on its Web site, lets people beat up on it to discover bugs and suggest changes, and then modifies it for general release. That interaction has been productive over the past few years. It will continue and perhaps permeate to information technology.

As authors of Web applications focus on the client, they will demand some of the traditional back-end services, such as data integrity, protection, recovery and joining, to be delivered to them as "clip art," says Eric Brown, a senior analyst at Forrester Research, Inc. in Cambridge, Mass. And as those services become more easily available, more programmers will join the fray because of the relative simplicity of writing applications. ■

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Mohan is a freelance writer in Mountain View, Calif.

### Selection guidelines

**Although there's a whole new breed of development tools for the Web, traditional tools providers also are coming into the market with Web offerings. If developers already are familiar with a particular vendor's tools, they should wait for the Web version instead of switching to a new vendor right away, experts say. Other pieces of advice include the following:**

- Users should know what they're shopping for and what they're building. Many times, vendors may give users an unrealistic checklist without regard for what they're trying to build. Users also should avoid the temptation to go with the market leader, because it may not have the best technology for their needs.

- Users should comparison-shop for features. They should look for scalability, not only of the applications but also of the development process – so programmers can be added – and the database. They should look for flexibility – the tools should interoperate with many databases and applications and support a second-generation technology. Finally, they should look for software life-cycle support. That includes support for design tools, coding tools, automatic generation of code, testing, installation, maintenance, monitoring and upgrading.

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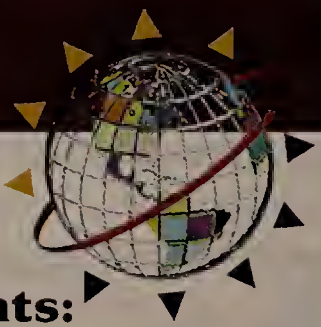

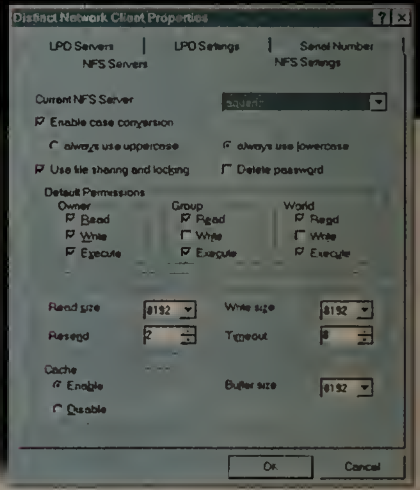
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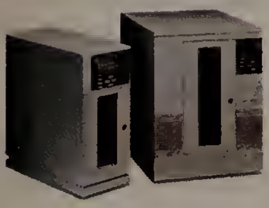

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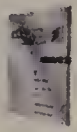

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# Forget playing the market . . .

# HIT THE BOOKS!

**By Alan R. Earls**

PHOTO ILLUSTRATION BY HARRY BARTLETT

To all the novice investors struggling to play the stock market, here's some expert advice: Give it up.

While the market may be enticing for new investors, the better skill to master is interpreting the financial performance of companies, according to industry experts.

Kenneth S. Janke Sr., president of the National Association of Investors Corp. (NAIC), a service organization for investors in Madison Heights, Mich., says that once individual investors can correctly read corporate financial data, they then should select a set of solid companies and stick with them for the long haul. In essence, it's like creating your own mutual fund, he adds.

Janke says that in addition to getting a fix on a company's basic financial statistics, an investor should evaluate companies by applying what the NAIC calls its four management tests. Put simply, make sure a company passes these tests before seriously considering it for investment.

- Revenue. This is straightforward. Revenue should be growing year to year.
- Earnings per share. Investors should see per-share earnings increase, not just overall income. This will show a company is looking out for its investors.
- Percentage earned on invested capital. This indicator shows how well a company is handling its money. The percentage is calculated by dividing the earnings per share by the book value per share of a stock. The percentage should be at least 12%, Janke says.
- Solid pretax profit on sales. This indicator shows how a company is performing aside from the taxes it may be paying. It's important because taxes can vary for a variety of reasons that aren't directly tied to the revenue and profit generation of a given financial period.

Janke adds that there are many other tests to apply to a company, but one key price test to consider is the well-known price/earnings ratio. The P/E ratio should be compared to a company's past P/E performance as well as the performance of its competitors.

The P/E ratio is the market price of a share divided by the firm's net income per share. It can tell an investor if a stock is priced high or low compared with other similar stocks. While P/E numbers vary from industry to industry, a good ratio these days is around 20. But P/E ratios shouldn't be judged by that number alone. Janke says to look for a current ratio that is at or below a company's five-year average ratio.

Ted Allrich, president of Allrich Investment Management in Redwood City, Calif., offers an additional thought on P/E ratios: "Investors will often buy a stock if the growth rate of the company's earnings equals or exceeds the P/E ratio," he says. "That's what's known as a fully valued stock."

Like Janke, Dave Jones, a security analyst and editor at the "California Technology Stock Letter" in Half Moon Bay, Calif., says individual investors – particularly novices – should avoid trying to play the market. "We've found that high-tech stocks can fluctuate in price by 50% or more over a 12-month period, so it rarely pays to chase a stock," he notes.

Furthermore, instead of focusing on earning per share, as some Wall Street experts prefer, Jones suggests looking at an indicator he calls the growth flow per share. This indicator is based on net income plus research and development per share. The purpose is to show the value of R&D as an investment in the future product stream, Jones says.

"While Wall Street penalizes [a company] for continuing to spend on R&D through an earnings slump, we are quite happy to buy a company whose earnings were flat precisely because they continued to spend on R&D — that's good long-term management," Jones says.

James R. Magid, a senior advisor at Needham & Co. in New York and president of the New York Electronic Analysts Group, echoes Janke's and Jones' warnings about trying to beat the market. He says individual investors should have a perspective of at least three to five years on stocks they purchase.

But Magid also maintains that not all investors need to spend hours learning the financial intricacies of a company. "There is nothing wrong with buying stock in a company with a product you really like," Magid says.

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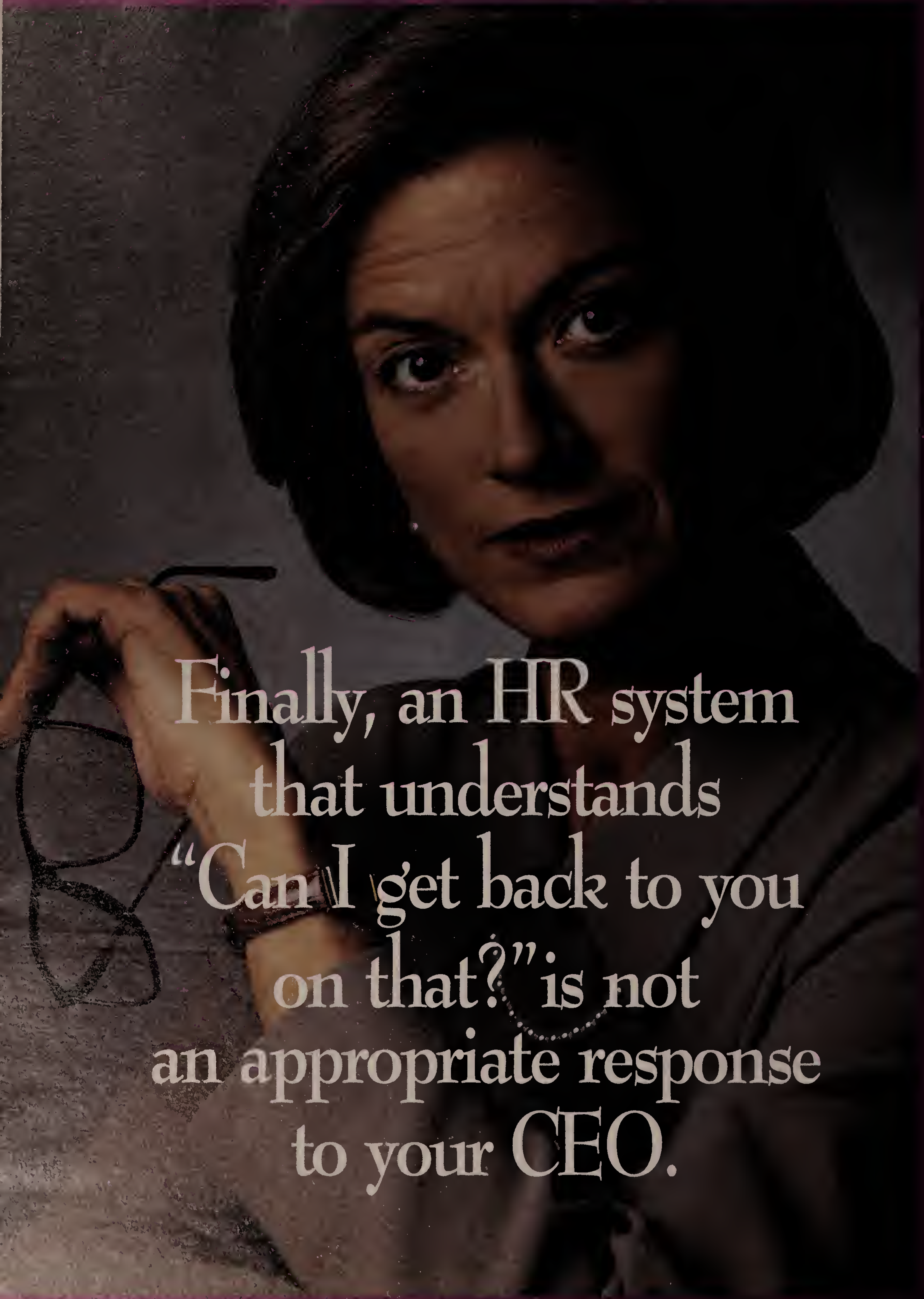
Earls is a freelance writer in Franklin, Mass.

### Cheat sheet

A selection of terms to use when evaluating companies

| | |
|---|---|
| **Current asset:** | Something of value owned by a company that can be converted into cash within a year. |
| **Cash flow statement:** | A report showing a company's cash flow over select periods of time. This statement offers the best evidence of a company's debt-paying ability. |
| **Current liability:** | A liability that must be paid within one year. |
| **Equity:** | Ownership interest, represented by net worth of a corporation, or the difference between assets and liabilities. |
| **Liquidity:** | The ease with which a company's assets can be converted into cash. |
| **Net working capital:** | The difference between current assets and current liabilities. |
| **Net worth:** | All assets minus all liabilities of a corporation. Equivalent to stock, paid-in capital and retained earnings. |

Source: *Starting and Running a Profitable Investment Club, the Official Guide from the NAIC*, Times Books, a division of RandomHouse, Inc.



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# The Week in Stocks

| Gainers | | Losers | |
|---|---|---|---|
| **PERCENT** | | | |
| Intuit Inc. | 37.7 | Streamlogic Corp. | -27.3 |
| PSINet | 37.3 | Standard Microsystems Corp.(L) | -23.3 |
| Micro Touch Systems Inc. | 25.7 | Business Objects(L) | -20.4 |
| Netscape Comm. Corp. | 20.5 | Centura Software | -20.0 |
| Chips and Technologies | 19.6 | Platinum Technology | -16.9 |
| Iomega Corp. | 18.9 | Applix Inc. | -12.9 |
| Quantum Corp. | 18.5 | Truevision Corp.(L) | -12.0 |
| Advanced Logic Research(H) | 17.7 | Open Market Inc. | -12.0 |
| **DOLLAR** | | | |
| Intel Corp.(H) | 13.00 | Arbor Software | -4.00 |
| Intuit Inc. | 10.00 | Cambridge Tech. Partners | -3.88 |
| Netscape Comm. Corp. | 9.38 | Applix Inc. | -3.25 |
| Seagate Technology | 8.38 | Sungard Data Systems | -3.00 |
| Gateway 2000 Inc. | 7.63 | Business Objects(L) | -2.88 |
| Ascend Communications | 7.25 | Open Market Inc. | -2.75 |
| Dell Computer Corp. | 6.50 | Standard Microsystems Corp.(L) | -2.63 |
| Compaq Computer Corp. | 6.38 | Platinum Technology | -2.50 |

## Industry Almanac

# SSA comes out swinging

**System Software Associates, Inc.'s (Nasdaq: SSAX)** stock fell 18% last Monday after the company's former auditor raised questions about its 1994 and 1995 results. But System Software Associates (SSA) fought back: It disagreed with Price Waterhouse's claims. The Chicago-based company then took the opportunity to reassure Wall Street about fourth-quarter results.

"This initial news [of possible financial misstatements] made a headline, and when you have this type of headline, people react with fear," says Bert Hochfeld, vice president of technology research at Josephthal Lyon & Ross, Inc. in New York.

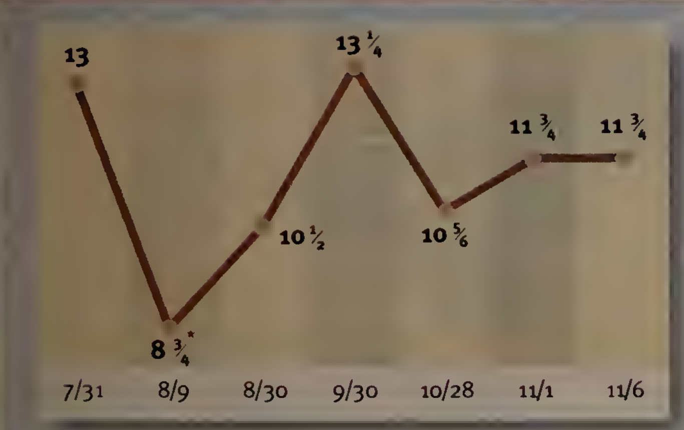
By late Monday, SSA stock had dropped more than $2 per share to $9.65. Company officials called analysts to talk up SSA's fourth quarter, which ended Oct. 31. The firm released preliminary data on the quarter and said it would likely be "the best ever quarter in our North American operations." Full financial results should be out next month.

SSA says KPMG Peat Marwick would reaudit fiscal 1994 and 1995. SSA says part of what Price Waterhouse is questioning relates to a well-publicized contract with Owens-Illinois, Inc. that resulted in a lawsuit and write-offs. SSA said it and Price Waterhouse agreed at the time about how this was recorded.

The stock price had started to climb by Tuesday; it had reached 11-3/8 by noon.

"Anytime you see something like this, there are concerns, but I think they've answered everyone's questions," says Michael Hutchison, a senior investment analyst at Barrington Research Associates, Inc. in Chicago. — *Rosemary Cafasso*

SSA has taken its share of swings



*SSA said Aug. 8 that third-quarter results would be lower than expected

| Exch | 52-Week Range | | | Nov. 8 2 PM | Wk Net Change | Wk Pct Change |
|---|---|---|---|---|---|---|
| **Communications and Network Services** | | | | | | UP 0.40% |
| COMS | 71.38 | 33.50 | 3 COM Corp. (H) | 71.38 | 3.75 | 5.5 |
| AIT | 66.88 | 49.63 | AMERITECH Corp. | 54.88 | 0.00 | 0.0 |
| T | 68.88 | 33.25 | AT & T (L) | 35.63 | 0.63 | 1.8 |
| ASND | 72.75 | 28.75 | Ascend Communications | 72.75 | 7.25 | 11.1 |
| BNYN | 13.63 | 3.50 | Banyan Systems Inc. (L) | 3.88 | -0.38 | -8.8 |
| BAY | 50.00 | 18.13 | Bay Networks Inc. (L) | 22.00 | 1.38 | 6.7 |
| BEL | 80.38 | 43.50 | Bell Atlantic Corp. | 61.38 | 0.88 | 1.4 |
| BLS | 45.88 | 35.25 | BellSouth Corp. | 41.13 | 0.63 | 1.5 |
| BRKT | 42.25 | 8.50 | Brooktrout Technology | 31.00 | -2.25 | -6.8 |
| CS | 87.75 | 53.00 | Cabletron Systems | 67.00 | 4.00 | 6.3 |
| CSCC | 91.25 | 20.63 | Cascade Communications | 76.88 | 5.00 | 7.0 |
| CGRM | 24.13 | 12.25 | Centigram Communications | 12.25 | -1.13 | -8.4 |
| CSCO | 67.00 | 32.00 | Cisco Systems Inc. | 63.63 | 2.75 | 4.5 |
| CLIX | 9.25 | 3.94 | Compression Labs Inc. (L) | 4.25 | 0.13 | 3.0 |
| CMNT | 10.50 | 4.00 | Computer Network Tech. | 5.50 | 0.13 | 2.3 |
| XCOM | 14.25 | 4.75 | CrossComm | 5.06 | -0.06 | -1.2 |
| DIGI | 43.25 | 12.63 | DSC Communications (L) | 14.56 | 0.94 | 6.9 |
| FORE | 44.75 | 23.13 | FORE Systems Inc. | 41.75 | 1.88 | 4.7 |
| GDC | 21.88 | 9.13 | General Datacomm Inds. | 10.38 | 0.50 | 5.1 |
| GSX | 44.25 | 30.50 | General Signal Networks | 41.50 | 0.63 | 1.5 |
| GTE | 49.25 | 37.75 | GTE Corp. | 43.25 | 1.50 | 3.6 |
| LU | 51.00 | 29.75 | Lucent Tech. | 49.00 | 2.00 | 4.3 |
| MADGF | 48.63 | 8.13 | Madge Networks NV (L) | 9.25 | -0.38 | -3.9 |
| MCIC | 31.88 | 22.38 | MCI Commmunications Corp. (H) | 28.63 | -1.63 | -5.4 |
| MNPI | 34.50 | 5.50 | Microcom Inc. | 8.63 | 0.13 | 1.5 |
| NETM | 34.00 | 5.50 | NetManage Inc. (L) | 5.50 | -0.63 | -10.2 |
| NTRX | 10.88 | 3.75 | Netrix Corp. | 5.88 | -0.63 | -9.6 |
| NCDI | 10.25 | 2.88 | Network Computing Devices | 7.25 | 0.00 | 0.0 |
| NWK | 36.00 | 11.13 | Network Equipment Tech. | 13.13 | -0.25 | -1.9 |
| NETG | 27.63 | 15.00 | Network General | 24.00 | -0.06 | -0.3 |
| NN | 37.25 | 15.50 | Newbridge Networks Corp. | 31.88 | 0.00 | 0.0 |
| NT | 66.00 | 35.75 | Northern Telecom Ltd. | 65.00 | 1.38 | 2.2 |
| NOVL | 19.13 | 8.75 | Novell Inc. (L) | 9.75 | 0.25 | 2.6 |
| NYN | 59.25 | 42.00 | Nynex Corp. | 45.75 | 0.75 | 1.7 |
| OCTL | 31.75 | 12.63 | Octel Communications Corp. | 16.13 | -0.13 | -0.8 |
| ODSI | 34.75 | 13.00 | Optical Data Systems Inc. | 14.00 | -0.44 | -3.0 |
| PAC | 35.25 | 25.88 | Pacific Telesis | 34.25 | 0.13 | 0.4 |
| PCTL | 44.72 | 24.50 | Picturetel Corp. (L) | 28.25 | 1.38 | 5.1 |
| PTON | 8.63 | 2.06 | Proteon Inc. (L) | 2.25 | 0.19 | 9.1 |
| RACO | 7.00 | 3.50 | Racotek Inc. | 5.50 | 0.56 | 11.4 |
| RETX | 10.88 | 1.81 | Retix | 6.06 | -0.81 | -11.8 |
| SBC | 60.25 | 46.00 | SBC Communications | 48.69 | -0.19 | -0.4 |
| SFA | 20.38 | 12.00 | Scientific Atlanta Inc. | 14.25 | 0.13 | 0.9 |
| SHVA | 87.25 | 25.13 | Shiva Corp. | 45.38 | 2.63 | 6.1 |
| FON | 45.50 | 29.25 | Sprint Corp. | 41.25 | 0.50 | 1.2 |
| SMSC | 23.50 | 8.50 | Standard Microsystems Corp. (L) | 8.63 | -2.63 | -23.3 |
| USRX | 105.50 | 32.75 | US Robotics | 63.38 | 2.25 | 3.7 |
| USW | 37.50 | 27.25 | U S West Inc. | 30.00 | -0.38 | -1.2 |
| XIRC | 21.75 | 9.00 | Xircom | 18.88 | -1.13 | -5.6 |
| XYLN | 76.00 | 34.00 | Xylan Corp. | 41.25 | -0.25 | -0.6 |
| **PCs and Workstations** | | | | | | UP 6.56% |
| AALR | 11.63 | 5.88 | Advanced Logic Research (H) | 11.63 | 1.75 | 17.7 |
| AAPL | 42.50 | 16.00 | Apple Computer Inc. | 26.00 | 2.13 | 8.9 |
| ASTA | 10.25 | 4.00 | AST Research Inc. | 4.19 | -0.31 | -6.9 |
| CPQ | 75.38 | 35.88 | Compaq Computer Corp. | 74.38 | 6.38 | 9.4 |
| DELL | 88.75 | 23.00 | Dell Computer Corp. | 87.13 | 6.50 | 8.1 |
| GATE | 57.63 | 18.00 | Gateway 2000 Inc. | 54.00 | 7.63 | 16.4 |
| HWP | 57.75 | 36.88 | Hewlett Packard Co. | 47.38 | 3.63 | 8.3 |
| MUEI | 23.50 | 8.75 | Micron International Inc. | 15.00 | -0.88 | -5.5 |
| NIPNY | 67.88 | 49.88 | NEC America | 57.88 | 2.50 | 4.5 |
| SGI | 38.75 | 17.88 | Silicon Graphics (L) | 19.50 | 1.25 | 6.8 |
| SUNW | 70.25 | 36.00 | Sun Microsystems Inc. | 64.50 | 2.75 | 4.5 |
| **Large Systems** | | | | | | UP 0.45% |
| AMH | 13.50 | 6.75 | Amdahl Corp. | 10.13 | 0.00 | 0.0 |
| DGN | 19.13 | 9.00 | Data General Corp. | 14.63 | -0.38 | -2.5 |
| DEC | 76.50 | 28.38 | Digital Equipment Corp. | 29.00 | -0.38 | -1.3 |
| IBM | 135.38 | 83.13 | IBM | 133.50 | 5.13 | 4.0 |
| MDCD | 20.25 | 6.50 | Meridian Data Inc. | 7.25 | -0.25 | -3.3 |
| NETF | 6.50 | 2.38 | NetFrame | 2.88 | -0.25 | -8.0 |
| SQNT | 19.13 | 10.13 | Sequent Computer Sys. | 16.25 | 1.63 | 11.1 |
| SEQS | 6.13 | 1.88 | Sequoia Systems Inc. | 2.38 | -0.13 | -5.0 |
| SRA | 36.13 | 16.63 | Stratus Computer Inc. | 23.13 | 0.88 | 3.9 |
| TDM | 15.25 | 8.38 | Tandem Computers Inc. | 13.50 | 1.00 | 8.0 |
| UIS | 9.13 | 5.38 | Unisys Corp. | 6.25 | -0.13 | -2.0 |
| **Software** | | | | | | OFF 1.50% |
| ADBE | 74.25 | 28.50 | Adobe Systems Inc. | 35.38 | 1.00 | 2.9 |
| AMSWA | 8.75 | 3.63 | American Software Inc. | 5.00 | -0.25 | -4.8 |
| APLX | 42.50 | 14.25 | Applix Inc. | 22.00 | -3.25 | -12.9 |
| ARSW | 82.75 | 28.75 | Arbor Software | 32.25 | -4.00 | -11.0 |
| ADSK | 44.25 | 18.50 | Autodesk Inc. | 21.13 | -1.88 | -8.2 |
| BGSS | 25.00 | 14.88 | BGS Systems Inc. | 22.38 | 0.88 | 4.1 |
| BMCS | 88.00 | 34.75 | BMC Software Inc. | 87.00 | 4.88 | 5.9 |
| BOOL | 32.50 | 19.75 | Boole and Babbage (H) | 29.75 | -0.25 | -0.8 |
| BORL | 21.25 | 4.75 | Borland Int'l Inc. (L) | 5.31 | 0.31 | 6.3 |
| BOBJY | 55.50 | 10.50 | Business Objects (L) | 11.25 | -2.88 | -20.4 |
| CAYN | 11.88 | 4.00 | Cayenne Software Inc. | 4.88 | -0.44 | -8.2 |
| CNTR | 8.13 | 2.88 | Centura Software | 3.00 | -0.75 | -20.0 |
| CYE | 30.63 | 14.13 | Cheyenne Software Inc. | 30.38 | 0.00 | 0.0 |
| COGNF | 34.75 | 10.88 | Cognos Inc. (H) | 33.75 | 1.00 | 3.1 |
| CA | 66.75 | 33.88 | Computer Associates | 60.50 | 2.00 | 3.4 |
| CVN | 15.50 | 5.75 | Computervision Corp. | 8.63 | -0.13 | -1.4 |
| CPWR | 57.75 | 15.50 | Compuware Corp. | 57.75 | 5.50 | 10.5 |
| CSRE | 32.00 | 10.75 | Comshare Inc. | 14.50 | 0.63 | 4.5 |
| COSFF | 19.13 | 6.56 | Corel Corp. (L) | 7.19 | -0.81 | -10.2 |
| DWTI | 13.00 | 3.25 | Dataware Technologies Inc. | 4.13 | 0.13 | 3.1 |
| FILE | 67.00 | 20.00 | Filenet Corp. | 28.31 | 0.06 | 0.2 |
| FRTE | 81.75 | 24.75 | Forte Software | 36.50 | -0.38 | -1.0 |
| FTPS | 40.63 | 4.88 | FTP Software Inc. (L) | 5.56 | -0.56 | -9.2 |
| HUMCF | 60.50 | 23.00 | Hummingbird Comm. Ltd. | 30.75 | 2.25 | 7.9 |
| HYSW | 25.13 | 9.75 | Hyperion Software Corp. | 22.00 | 0.88 | 4.1 |
| IRIC | 16.25 | 10.00 | Information Resources | 12.00 | -0.75 | -5.9 |
| IFMX | 36.75 | 16.88 | Informix Corp. | 20.38 | -2.13 | -9.4 |
| INGR | 20.13 | 8.63 | Intergraph Corp. | 9.25 | -0.13 | -1.3 |
| LEAF | 12.63 | 2.00 | Interleaf Inc. | 2.50 | 0.00 | 0.0 |
| ISLI | 17.25 | 7.50 | Intersolv Inc. | 8.00 | 0.13 | 1.6 |
| INTU | 87.75 | 25.88 | Intuit Inc. | 36.50 | 10.00 | 37.7 |
| LGWX | 22.25 | 5.38 | Logic Works | 5.50 | -0.19 | -3.3 |
| MAPS | 22.75 | 7.50 | MapInfo Corp. | 10.75 | -0.13 | -1.1 |
| MATH | 9.25 | 3.25 | MathSoft | 3.63 | -0.38 | -9.4 |
| MCAF | 52.88 | 14.00 | McAfee Associates | 44.50 | -2.13 | -4.6 |
| MENT | 21.88 | 8.25 | Mentor Graphics (L) | 8.50 | 0.13 | 1.5 |
| MIFGY | 21.25 | 8.25 | Micro Focus | 14.38 | -0.38 | -2.5 |
| MGXI | 18.63 | 5.63 | Micrografx Inc. | 5.63 | -0.13 | -2.2 |
| MSFT | 142.00 | 79.88 | Microsoft Corp. | 142.00 | 4.25 | 3.1 |
| ORCL | 46.38 | 26.38 | Oracle Corp. | 45.63 | 1.75 | 4.0 |
| PMTC | 54.50 | 25.88 | Parametric Technology | 50.50 | 1.88 | 3.9 |
| PARQ | 14.63 | 2.25 | ParcPlace Systems Inc. | 2.63 | 0.00 | 0.0 |
| PSFT | 94.00 | 34.25 | Peoplesoft | 93.75 | 0.94 | 1.0 |
| PTEC | 20.38 | 10.63 | Phoenix Technologies | 17.63 | 0.88 | 5.2 |
| PSQL | 13.50 | 3.13 | Platinum Software | 12.13 | 0.13 | 1.0 |
| PLAT | 18.75 | 9.25 | Platinum Technology | 12.25 | -2.50 | -16.9 |
| PRGS | 38.00 | 12.13 | Progress Software Corp. | 15.13 | -0.38 | -2.4 |
| RNBO | 25.50 | 14.63 | Rainbow Technologies Inc. | 17.88 | 0.50 | 2.9 |
| REDB | 61.00 | 18.25 | Red Brick Systems Inc. | 22.00 | -2.25 | -9.3 |
| SAPE | 58.25 | 29.25 | Sapient Corp. | 44.50 | -1.00 | -2.2 |
| SCOC | 9.13 | 5.50 | SCO Inc. | 6.38 | -0.13 | -1.9 |
| SDTI | 109.00 | 34.25 | Security Dynamics Tech. | 81.63 | 1.50 | 1.9 |
| SKEY | 36.00 | 13.38 | Softkey International Inc. | 19.25 | -1.00 | -4.9 |
| SPCO | 4.25 | 1.13 | Software Publishing Corp. (L) | 1.19 | -0.13 | -9.5 |
| SQAX | 39.75 | 16.00 | SQA Inc. | 25.75 | -2.25 | -8.0 |
| SOTA | 19.75 | 9.19 | State of the Art | 11.50 | -0.31 | -2.6 |
| SSW | 81.38 | 28.25 | Sterling Software Inc. | 32.63 | -0.25 | -0.8 |
| SDRC | 37.38 | 15.00 | Struct. Dynamics Research | 17.88 | -0.25 | -1.4 |
| SYBS | 39.38 | 13.50 | Sybase Inc. | 16.38 | -1.13 | -6.4 |
| SYMC | 28.75 | 8.75 | Symantec Corp. | 11.63 | 0.88 | 8.1 |
| SNPS | 50.50 | 27.50 | SynOpsys | 44.75 | -0.56 | -1.2 |
| SSAX | 28.38 | 8.25 | System Software Assoc. | 11.50 | -0.13 | -1.1 |
| SYSF | 36.50 | 4.38 | Systemsoft Corp. | 29.75 | 2.00 | 7.2 |
| TRUV | 9.63 | 2.63 | Truevision Corp. (L) | 2.75 | -0.38 | -12.0 |
| VIEW | 17.50 | 8.38 | ViewLogic Systems | 9.50 | -0.38 | -3.8 |
| VMRK | 12.63 | 5.50 | VMark Software Inc. | 8.50 | -0.38 | -4.2 |
| WALK | 15.38 | 6.25 | Walker Interactive Systems | 13.88 | 0.25 | 1.8 |
| WALL | 27.50 | 12.25 | Wall Data Inc. | 13.38 | -0.63 | -4.5 |
| WANG | 26.13 | 15.38 | Wang Laboratories Inc. | 23.06 | 0.19 | 0.8 |
| **Internet** | | | | | | UP 4.45% |
| AOL | 71.00 | 22.38 | America On-Line | 25.88 | -0.50 | -1.9 |
| BBN | 48.75 | 15.63 | BBN Corp. | 24.50 | 3.50 | 16.7 |
| CSRV | 35.50 | 8.63 | Compuserve Corp. | 9.44 | -0.66 | -6.5 |
| EDFY | 55.75 | 13.75 | Edify Corp. (L) | 14.50 | -0.13 | -0.9 |
| LCOS | 29.25 | 5.75 | Lycos Inc. | 11.88 | 0.88 | 8.0 |
| NETC | 91.50 | 12.50 | Netcom On-Line | 15.25 | 0.00 | 0.0 |
| NSCP | 87.00 | 34.50 | Netscape Comm. Corp. | 55.13 | 9.38 | 20.5 |
| OMKT | 42.25 | 11.50 | Open Market Inc. | 20.25 | -2.75 | -12.0 |
| PSIX | 29.00 | 6.75 | PSINet | 12.88 | 3.50 | 37.3 |
| QDEK | 39.50 | 4.56 | Quarterdeck Corp. (L) | 5.13 | 0.38 | 7.9 |
| RAPT | 39.25 | 12.75 | Raptor Systems | 22.38 | 1.63 | 7.8 |
| SCUR | 64.50 | 9.00 | Secure Computing Corp. | 10.25 | -0.75 | -6.8 |
| SPYG | 61.00 | 10.38 | Spyglass Inc. (L) | 11.13 | -0.50 | -4.3 |
| YHOO | 43.00 | 15.50 | Yahoo! Inc. | 19.00 | -0.69 | -3.5 |
| **Semiconductors** | | | | | | UP 10.33% |
| AMD | 23.13 | 10.25 | Advanced Micro Devices | 20.38 | 2.63 | 14.8 |
| ADI | 30.13 | 17.00 | Analog Devices Inc. | 28.63 | 1.88 | 7.0 |
| CHPS | 23.63 | 7.88 | Chips and Technologies | 23.63 | 3.88 | 19.6 |
| CRUS | 42.38 | 12.63 | Cirrus Logic | 19.63 | 0.75 | 4.0 |
| CY | 19.13 | 9.13 | Cypress Semiconductor Corp. | 11.75 | 1.00 | 9.3 |
| CYRX | 41.88 | 11.50 | Cyrix | 19.00 | 1.38 | 7.8 |
| INTC | 121.75 | 49.81 | Intel Corp. (H) | 121.75 | 13.00 | 12.0 |
| LSI | 48.00 | 17.00 | LSI Logic Corp. | 30.25 | 3.25 | 12.0 |
| LSCC | 40.00 | 19.75 | Lattice Semiconductor | 39.63 | 4.13 | 11.6 |
| MCRL | 25.50 | 12.00 | Micrel Semiconductor Inc. | 21.88 | 1.63 | 8.0 |
| MU | 69.38 | 16.63 | Micron Technology | 29.63 | 3.88 | 15.0 |
| MOT | 68.63 | 44.50 | Motorola Inc. (L) | 48.13 | 3.00 | 6.6 |
| NSM | 25.38 | 13.00 | National Semiconductor | 21.25 | 2.13 | 11.1 |
| TXN | 67.00 | 40.50 | Texas Instruments | 53.63 | 5.50 | 11.4 |
| VLSI | 23.75 | 10.38 | VLSI Technology | 20.44 | 2.44 | 13.5 |
| XLNX | 46.50 | 23.25 | Xilinx | 38.88 | 4.25 | 12.3 |
| ZLG | 40.38 | 14.88 | Zilog Inc. | 19.63 | -0.13 | -0.6 |
| **Peripherals and Subsystems** | | | | | | UP 4.98% |
| APCC | 23.88 | 7.88 | American Power Conversion (H) | 23.88 | 3.38 | 16.5 |
| ADPT | 65.75 | 35.00 | Adaptec Inc. | 63.69 | 2.69 | 4.4 |
| CBEX | 9.63 | 3.00 | Cambex Corp. | 3.00 | 0.00 | 0.0 |
| CREAF | 11.63 | 3.50 | Creative Technology Ltd. | 5.88 | -0.38 | -6.0 |
| RACE | 12.75 | 3.63 | Data Race Inc. | 11.25 | 1.38 | 13.9 |
| DTM | 8.88 | 4.13 | Dataram Corp. | 8.00 | 0.06 | 0.8 |
| EMC | 27.75 | 15.13 | EMC Corp. | 26.88 | 0.63 | 2.4 |
| EMLX | 21.38 | 6.38 | Emulex Corp. | 18.00 | 0.00 | 0.0 |
| ESCC | 29.00 | 19.00 | Evans and Sutherland | 22.25 | 1.25 | 6.0 |
| EXBT | 22.75 | 11.38 | Exabyte | 13.88 | 0.88 | 6.7 |
| IISLF | 4.13 | 1.44 | Intelligent Info. Systems | 1.75 | 0.06 | 3.7 |
| IOMG | 55.13 | 4.13 | Iomega Corp. | 25.13 | 4.00 | 18.9 |
| IPLS | 8.25 | 1.63 | IPL Systems Inc. | 1.88 | 0.13 | 7.1 |
| KMAG | 37.00 | 17.63 | Komag Inc. | 31.00 | 2.50 | 8.8 |
| MTSI | 22.25 | 11.25 | Micro Touch Systems Inc. | 22.00 | 4.50 | 25.7 |
| PEAK | 34.75 | 11.00 | Peak Technology Group | 11.00 | -0.88 | -7.4 |
| PNCL | 19.75 | 4.88 | Pinnacle Micro Inc. | 5.94 | -0.06 | -1.0 |
| AQM | 6.75 | 3.25 | QMS Inc. | 5.75 | 0.00 | 0.0 |
| QNTM | 26.13 | 10.88 | Quantum Corp. | 24.00 | 3.75 | 18.5 |
| RDUS | 4.88 | 0.94 | Radius Inc. | 1.44 | 0.00 | 0.0 |
| SEG | 74.63 | 36.13 | Seagate Technology | 74.63 | 8.38 | 12.6 |
| STK | 47.25 | 22.00 | Storage Technology (H) | 47.25 | 3.88 | 8.9 |
| STLC | 8.75 | 1.00 | Streamlogic Corp. | 1.00 | -0.38 | -27.3 |
| TEK | 59.13 | 29.75 | Tektronix Inc. | 42.00 | 3.13 | 8.0 |
| WDC | 55.00 | 14.38 | Western Digital Corp. (H) | 55.00 | 5.50 | 11.1 |
| XRX | 58.25 | 39.88 | Xerox Corp. | 45.00 | -1.38 | -3.0 |
| **Services** | | | | | | UP 2.83% |
| AMSY | 33.38 | 17.50 | American Mgmt. Systems | 31.25 | -1.63 | -4.9 |
| ANLY | 25.75 | 13.63 | Analysts Int'l | 25.50 | 1.00 | 4.1 |
| AUD | 45.75 | 34.88 | Auto Data Processing | 42.38 | 0.88 | 2.1 |
| BDMI | 61.50 | 24.25 | BDM International Inc. | 53.25 | 2.50 | 4.9 |
| CATP | 37.25 | 13.88 | Cambridge Tech. Partners | 30.25 | -3.88 | -11.4 |
| CEN | 54.88 | 36.63 | Ceridian Corp. | 48.88 | -1.50 | -3.0 |
| CDO | 33.00 | 19.88 | Comdisco Inc. | 31.38 | 1.88 | 6.4 |
| CHRZ | 54.00 | 15.00 | Computer Horizons | 34.75 | 3.50 | 11.2 |
| CSC | 82.75 | 64.13 | Computer Sciences | 74.38 | 1.13 | 1.5 |
| TSK | 42.88 | 16.75 | Computer Task Group (H) | 42.88 | 4.88 | 12.8 |
| CPU | 61.75 | 12.88 | CompUSA Inc. | 51.88 | 6.38 | 14.0 |
| CDAT | 28.63 | 12.75 | Control Data Systems Inc. | 21.88 | -1.00 | -4.4 |
| EGGS | 13.88 | 4.75 | Egghead Discount Software (L) | 5.56 | 0.50 | 9.9 |
| EDS | 63.38 | 40.75 | Electronic Data Systems Corp. (L) | 44.63 | 0.75 | 1.7 |
| INAC | 38.50 | 9.88 | Inacom Corp. | 34.25 | 1.63 | 5.0 |
| INEL | 11.50 | 3.50 | Intelligent Electronics | 8.75 | 0.38 | 4.5 |
| KEA | 49.25 | 18.25 | Keane Inc. | 49.25 | 2.88 | 6.2 |
| MICA | 22.00 | 7.25 | Microage Inc. (H) | 22.00 | 2.38 | 12.1 |
| PAYX | 63.63 | 26.63 | Paychex | 59.88 | 2.13 | 3.7 |
| PMS | 55.50 | 33.13 | Policy Management Sys. | 37.75 | 2.50 | 7.1 |
| REY | 28.25 | 17.75 | Reynolds and Reynolds | 26.88 | 0.31 | 1.2 |
| SCBI | 30.50 | 14.44 | SCB Computer Tech. Inc. | 19.25 | -0.75 | -3.8 |
| SEIC | 26.38 | 17.75 | SEI Corp. | 22.63 | 2.38 | 11.7 |
| SMED | 72.13 | 37.38 | Shared Medical Systems | 44.00 | -1.50 | -3.3 |
| SSPE | 30.50 | 17.00 | Software Spectrum Inc. | 26.38 | -0.50 | 1.9 |
| VST | 29.75 | 9.00 | VanStar Corp. | 23.63 | -1.00 | 4.1 |
| SNDT | 47.50 | 27.50 | Sungard Data Systems | 39.75 | -3.00 | -7.0 |

Key: (H) = New annual high reached in period (L) = New annual low reached in period

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# Apple

CONTINUED FROM PAGE 1

tems features they have been demanding, including pre-emptive multitasking, memory protection, symmetrical multiprocessing, multithreading and an object-oriented development environment.

The merger of the two technologies reportedly will sacrifice some compatibility with the current crop of Macintosh applications. However, several users interviewed last week shrugged off the trade-off, and developers were enthusiastic.

### Joining forces

Combining Apple's NuKernel microkernel and Be's BeOS application programming interface will result in a portable operating system code, a native PowerPC application model and enable the operating system to be a virtual Java.

"I don't think the backward compatibility is that big a deal," said Mike Bailey, a systems analyst at Lockheed Martin Missiles & Space in Sunnyvale, Calif., that has about 10,000 Macintoshes. "The compatibility can be handled through emulation or by using the forthcoming [Common Hardware Reference Platform] systems due out early next year. It's much more important for Apple to move forward and deliver an [operating system] that is competitive with NT."

### Model meld

Apple in Cupertino, Calif., is expected to meld BeOS' native PowerPC application model into the microkernel it was developing for the recently dismantled Mac OS 8 project, three sources involved with implementing Apple's systems software plans said.

The long-delayed Mac OS 8, code-named Copland, promised some of those features but was scrapped in favor of adding incremental features into smaller Mac OS releases that would ship every six months.

Sources inside and close to Apple said the specifics of the deal are being worked out. If everything goes according to the tentative schedule, users would get the hybrid operating system in the middle of next year, they said.

Apple spokesman Russell Brady declined to comment on any potential deal with Be but said, "Be's development work addresses similar issues as Apple's development work. And while this is not an announcement of strategy plans or an impending deal, it is an acknowledgment of potential leverage with Be."

Be officials declined to comment.

Sources close to both companies said Apple CEO Gilbert F. Amelio and Be's chairman and CEO, Jean-Louis Gassee met last week in Hawaii.

### Nice move

Meanwhile, some of Apple's harshest critics applauded the potential move and called it brilliant.

"Combining the two operating systems would be a technological leap from where Apple was headed," said Tom Rhinelander, an analyst at Forrester Research, Inc., a market research firm in Cambridge, Mass. "This is a really big deal in the [operating system] world because it puts Apple in a [technological] position to jump over Windows 95 and compete with NT."

"If Apple changes its strategy, it would be a major advance in operating system technology," said Eugene Glazer, an analyst at Dean Witter Reynolds, Inc., a securities and investment banking firm in New York. "Talking to Be about these advances makes a lot of sense, and [including technology developed externally] would be a radical change for Apple. A new [operating system] in the mid-1997 time frame might also help Apple achieve its goal of returning to profitability in 1998."

Despite such enthusiasm, industry watchers said Apple will face tough competition because Microsoft's Windows 95 shipped more than 18 months ago, and Windows NT 5.0 is expected to ship in the first half of next year.

One Macintosh user said he would welcome the introduction of any technology that advanced the Mac OS.

"It's great that Apple is able to utilize the latest and the greatest technology even if it wasn't developed by them," said John Papa, a partner at The Carson Group, a financial services firm in New York with more than 100 Macintoshes. "To be competitive, Apple has to push forward and not worry about upsetting the customers that have older Macs."

# Informix

CONTINUED FROM PAGE 1

the information out to the hotels and then to change it," Thomson said. Doing it via the Web would simplify things, he added.

And based on a recent briefing at Informix, the new Web architecture should "make it a lot easier for us to develop the browser logic" that connects to the Informix database, he said.

Informix wouldn't comment other than to confirm it will announce a set of services for creating Web applications that can dynamically tailor content to users.

According to industry sources, the architecture includes lightweight middleware, code-named WebSmart Connect, that resides on a Web server and connects users directly to an Informix database or to applications linked to the database. The middleware will support both existing Informix relational databases and the upcoming Universal Server relational/object hybrid.

### Targeting the Web

**Informix's Web architecture is expected to include:**

**Web application services**

- Middleware to connect Web servers to Informix
- SQL support embedded in HTML pages and Java applications
- Common interfaces across all Informix databases
- Tool kit with APIs and prebuilt Web services libraries

**Java product strategy**

- Drag-and-drop development environment
- Support for writing Java-based DataBlades
- Ability to invoke Java applets from SQL applications

Informix also is expected to announce plans for Java-based tools and services, plus support for developing ActiveX clients, sources said.

The firm also has signed on several software vendors to support the architecture with their own development and Web content management tools.

Wayne Eckerson, an analyst at Patricia Seybold Group in Boston, said Informix promises Web-based programming interfaces that will "be knowledgeable about what the database can do and then be able to take advantage of it."

The strategy is a response to Oracle Corp.'s recent announcement of its Network Computing Architecture, he said.

### Web momentum needed

Informix needs to regain Web momentum after Oracle signed a database bundling deal two weeks ago with Netscape Communications Corp. that cuts into a cozy relationship Informix had with Netscape.

"Informix was sort of in the catbird's seat relative to the Web," said Donald A. DePalma, an analyst at Forrester Research, Inc. in Cambridge, Mass. "But they're not anymore."

# Net boxes

CONTINUED FROM PAGE 1

Yet, managers must limit some client functions to keep their sanity when they support thousands of users.

"It's a cost-of-ownership issue," said Theo Forbath, a consultant at Northeast Consulting Resources, Inc. in Boston. "Personal computers belong at home. Corporate computers must be viewed like the telephone and other common business tools."

### Unplugged

At John Hancock Mutual Life Insurance Co. in Boston, for example, "We already remove administrator capability from Windows NT stations so users can't change their configuration," said Tim Pijoan, a senior systems technician at the company.

That step streamlines help desk assistance and provides a default state for quick recovery after a hard disk crash, Pijoan said. The next step — forcing all user storage from the station to a server — would assure backup and protection of data that resides throughout the enterprise, he said.

Currently, each desktop can drain more than $10,000 each year, analysts estimate, largely because of labor-intensive support that could be handled instead by central control.

To slash those costs, regional managers at United Parcel Service of America, Inc. can now monitor and control more than 45,000 user stations remotely over the network. Implementing remote access software has halved the need to dispatch service technicians in all districts, according to Randy Smith, telecommunications project manager at Atlanta-based UPS.

**Systems management**

Network computers from vendors such as IBM, Sun Microsystems, Inc. and Oracle Corp. and the NetPC systems from PC makers that use specifications from Microsoft Corp. and Intel Corp. will include agent software to enable this type of remote support. And their lack of a floppy disk drive will be a boon to many managers.

"I'd like to rip the floppy disk out of every machine in the company," said an irate systems administrator, who asked to remain anonymous.

She said a diskless configuration would help prevent users from infecting the entire network with viruses.

Lower management costs would come more from central software control than from a limited hardware configuration, predicted Richard Weiss, architect for enterprise management systems at Charles Schwab & Co. in San Francisco.

Network computers would pull software from a server in modules as needed or load an entire application. Either way, managers must update files on servers only instead of dealing with every individual desktop.

"I'd love to be able to do away with software distribution hassles," said Mike Tardif, vice president of enterprise technology for operations and systems management at Goldman, Sachs & Co. in New York.

But because these systems rely on the network, reliable connections and adequate bandwidth will become even more essential.

"Network support will be a big concern for anyone who tries to hand out a terminal," said Scott Parker, network supervisor at Turner Broadcasting System, Inc. in Atlanta.

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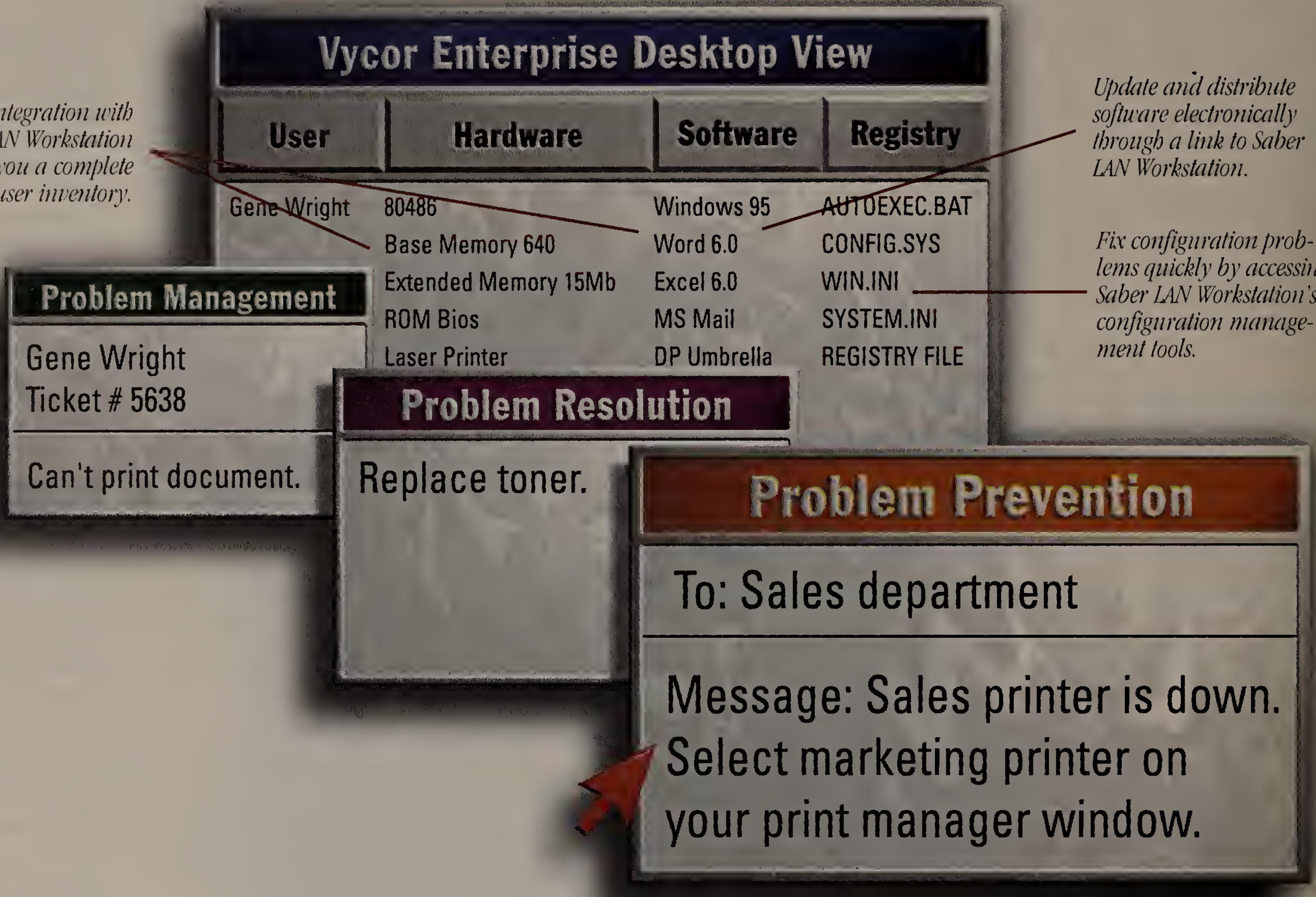
# INTRODUCING THE FIRST HELP DESK WITH AUTOMATIC PROBLEM PREVENTION.



**Vycor Enterprise Desktop View**

| User | Hardware | Software | Registry |
|---|---|---|---|
| Gene Wright | 80486 | Windows 95 | AUTOEXEC.BAT |
| | Base Memory 640 | Word 6.0 | CONFIG.SYS |
| | Extended Memory 15Mb | Excel 6.0 | WIN.INI |
| | ROM Bios | MS Mail | SYSTEM.INI |
| | Laser Printer | DP Umbrella | REGISTRY FILE |

**Problem Management**

Gene Wright
Ticket # 5638

Can't print document.

**Problem Resolution**

Replace toner.

**Problem Prevention**

To: Sales department

Message: Sales printer is down. Select marketing printer on your print manager window.

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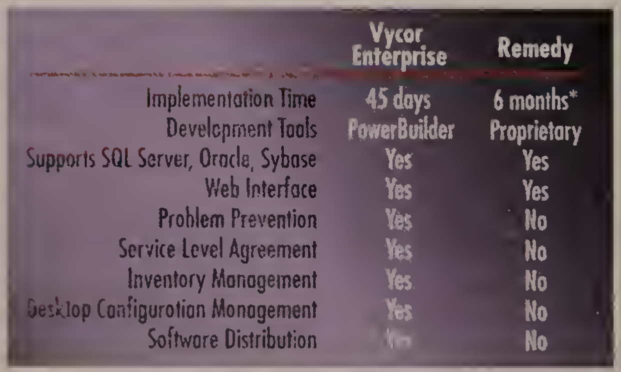
Now there's a way to solve help desk problems faster *and* reduce your calls dramatically. Introducing Vycor Enterprise with network management integration and problem prevention.



| | Vycor Enterprise | Remedy |
|---|---|---|
| Implementation Time | 45 days | 6 months* |
| Development Tools | PowerBuilder | Proprietary |
| Supports SQL Server, Oracle, Sybase | Yes | Yes |
| Web Interface | Yes | Yes |
| Problem Prevention | Yes | No |
| Service Level Agreement | Yes | No |
| Inventory Management | Yes | No |
| Desktop Configuration Management | Yes | No |
| Software Distribution | Yes | No |

*As reported by former Remedy customers.

Vycor Enterprise is the first help desk solution that lets you manage, solve and even prevent problems across your entire enterprise.

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**David Coursey**

# Underwhelmed by the NetPC

Am I missing something, or is the new Microsoft/Intel NetPC "standard" just a warming over of the diskless PC, an idea that suffered a miserable death in the early '90s? That's the question I asked a PR person assigned to flog the NetPC, and it probably says something about the seriousness of the project that the flack had never even heard of the diskless PC.

OK, I meant "obscure death," given that I'm not entirely sure in what year it took place and given the way one failure seems to fade into the next.

Still, I distinctly remember the roaring silence from customers when the diskless PC belly flopped into the world.

The NetPC, announced a few weeks ago at the Microsoft Site Builder Conference in San Jose, Calif., is the Wintel world's response to Oracle boss Larry Ellison's Network Computer. And while a network computer, whatever you may think about the concept, is new and different — a machine that uses Java as an operating system — the NetPC is old and unexciting. At least it looks interesting. It appears warm (if not fuzzy), with rounded edges; this could turn out to be its best selling point, along with the fact that a NetPC is exactly the same thing as a Windows-based network computer.

The NetPC is a Windows box designed for remote management. Microsoft has created what it calls a Zero Administration Initiative to spearhead its effort to keep IS professionals from actually having to confront users face-to-face in their work areas.

How did Microsoft do this? The company scuttled the floppy disk and limited the hardware options to those that Windows can figure out how to install and manage without help from the user. Then the expansion slots were done away with, just to make sure nothing gets installed in the machine that might mess things up. This is the same sort of thing promised with the diskless PC, but Windows had fewer management skills back then.

Windows now knows more about hardware, and it's possible that a low-maintenance desktop can be created. And it will probably be price-competitive with a non-Intel, non-Windows-based network computer. Of course, a Windows box misses the whole point of a network computer, which uses Java to create a universal target environment for client/server applications. But any Windows 95 box that runs Netscape's Navigator or Microsoft's Internet Explorer already has Java capabilities and thus qualifies as a network computer. Every time I have to explain this, I feel like I'm trapped in some sort of logic loop, but I hope you get the concept.

The NetPC isn't a bad idea as much as it's an old dog that may have finally perfected a few tricks. But that faint praise comes from someone who thought diskless PCs had a place in the world, then watched them receive a resounding comeuppance in the marketplace.

What will be interesting is hearing from all the people who pooh-poohed the network computer because it wasn't a "real computer" fall into fits of apologetics trying to make the NetPC into a "real computer." Most people would say a Wintel machine that doesn't allow users to install anything locally doesn't meet the test of being "personal."

---

Coursey has trouble saying "diskless PC" five times in quick succession. But what does he know, anyway? You can set him straight by writing him at david@coursey.com.

---

**Charles Babcock**

# What's that ringing in my ears? High tech . . .

It's been said that technology allows us to stay in touch, no matter how far we roam. Somehow, for me, stepping through the doors of an airport or hotel immediately puts these claims at risk.

In far too many cases, technology seems to impede communication as much as it helps. It used to be that no communication occurred unless one human actually made contact with another.

Now, pushing the buttons to send E-mail, a file or a fax relieves the sender of further obligation. After all, the technology is in touch, and it's just about infallible.

Isn't it?

Next week, thousands of computer users will find once again that this isn't so. As they go to Las Vegas for yet another Comdex, they will disappear from the radar screens of their organizations as they settle into overpriced rooms.

Las Vegas hoteliers can't imagine that their guests want to use computers in their rooms. Telephone wires disappear into walls without the benefit of jacks, and when you rig a connection through the telephone itself, the front desk calls to say the hotel can't handle digitized data.

Hotels elsewhere bill themselves as friendly to business travelers, and at least you find in them telephones that use wall jacks. But in some cases, the little tension bars on the plugs have been clipped off below the surface of the wall, rendering them unreachable by a business traveler's finger. This in turn encourages guests to use the business center downstairs — for a fee.

(We recently sent two reporters to hotels that pride themselves on their high-tech amenities — and both came back somewhat disappointed. See In Depth, page 104.)

To counteract such planned deficiencies, I carry a little jackknife that allows me to free a phone plug, with or without the manager's permission. The phone jack is invariably located behind the headboard of a king-size bed that can be moved only with Herculean effort. Once the computer line is plugged in to the jack, you find that the only electrical outlet available for your power supply is on the opposite wall. As your laptop settles into the 4-in.-thick comforter and starts to overheat, you realize this arrangement is an intended feature of the room: If you go to bed immediately after sending your messages, your feet will be as warm as toast.

In many ways, pushing the buttons of technology is the avoidance of connections as well as the making of them. We can use technology in such a way that we air an idea without sticking around for the feedback. Hence, the instant gratification of E-mail leads co-workers to send messages to one another that they wouldn't think of saying in person.

True communication involves listening to the response, but all too often, we use high tech to shield ourselves from real human contact. The most advanced communication devices can be used to beam the most thoughtless messages.

I heard of an office where workers got together and agreed to have more face-to-face communication and less E-mail; they pledged more direct contact with customers and fewer file transfers and faxes.

Maybe there was a virtue to the old limitations. If it wasn't worth showing up in someone's presence to say, maybe it wasn't worth saying in the first place.

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Babcock is *Computerworld's* technical editor. His Internet address is charles_babcock@cw.com.

# alt.cw

Here's a new form of money laundering spotted by the Associated Press. Tokyo Mitsubishi Bank in Japan has opened a new "Total Anti-Germ Branch." Automated teller machines are clad in special antibacterial plastic and dispense disinfected cash. "It's popular with young female customers, many of whom say they don't want to touch things handled by middle-aged men," a bank spokesman said.

## Computer book best-sellers

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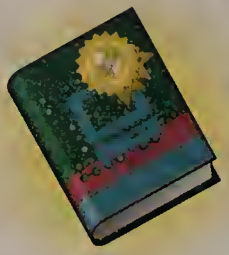
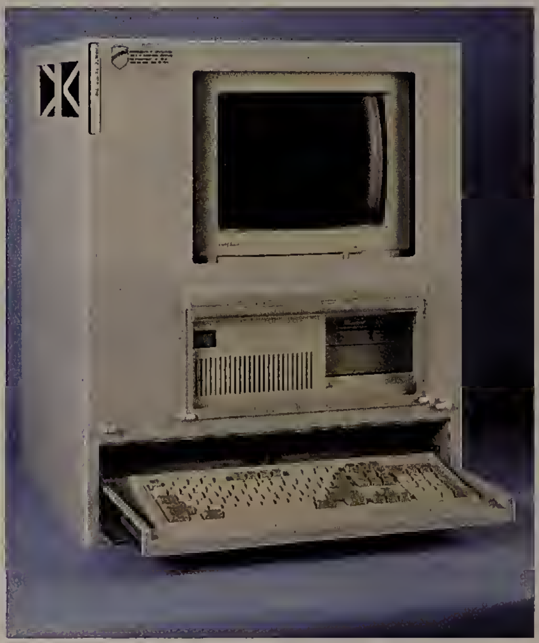
**General category (author, publisher)**

1. *Internet for Dummies*, 3rd edition (John Levine, IDG Books)
2. *PCs for Dummies*, 4th edition (Dan Gookin, IDG Books)
3. *Java in a Nutshell* (David Flanagan, O'Reilly & Associates)
4. *Upgrading and Repairing PCs*, 5th edition (Scott Mueller, Que)
5. *HTML: The Definitive Guide* (Chuck Musciano, O'Reilly & Associates)
6. *Official Netscape Navigator 2.0 Book for Windows 95* (Phil James, Ventana Press)
7. *Computers Simplified*, 2nd edition (Ruth Maran, IDG Books)
8. *The Internet Yellow Pages*, 3rd edition (Harley Hahn, Osborne/McGraw-Hill)
9. *HTML Sourcebook*, 2nd edition (Ian Graham, John Wiley & Sons)
10. *Java for Dummies* (Aaron Walsh, IDG Books)



## E-mail for truckers

**Breaker, breaker!** A great big convoy soon may be cruising the Internet, as truckers trade in their CB radios for electronic mail. Qualcomm, a San Diego-based E-mail software vendor, and Transcommunications, a Chattanooga, Tenn.-based telecommunications company, are joining forces to bring E-mail to the trucking industry. The CabCard Personal Communications service lets truck drivers receive E-mail and voice services through Transcommunications' landline network and Qualcomm's OmniTrac satellite network. Qualcomm officials said a driver using the system now pays about $60 per month for the service, compared with the $150 per month he was paying for cellular telephone calls to family, friends and others. — *Randy Weston*



**Pop quiz.** *This product is called:*
**a.** *The PC Quarantine Box. Prevents the spread of viruses!*
**b.** *The Tempest PC. Shielded to prevent emissions of electromagnetic signals. Meets National Security Agency specifications.*
**c.** *The Ultra-Clean PC DustShield.*
**d.** *The Anti-Theft PC Cabinet, from the makers of The Club.*
**Answer: c.** *The DustShield from Envirosafe Technologies in Jacksonville, Fla. Air is drawn into the enclosure through a two-stage filter, which removes 98% of the dust in industrial environments. Access to disk drives is through a hinged, Plexiglas door.*

Send offbeat photos news and humor to mbetts@cw.com

If your item is used, we'll send you a wicked cool T-shirt

## Inside Lines

### The three amigos

Marketing gamesmanship was in full swing last week in San Francisco. After it was barred from the Moscone Center by Oracle, Sybase tried to lure OpenWorld attendees to a party at a nearby club to promote its Powersoft development tools. Meanwhile, Oracle executives were alleging to anyone who would listen that embracing Informix's DataBlade technology for multimedia data is a sure way to crash your database. Informix, which strongly begs to differ, responded by suggesting a series of questions to ask Oracle at the conference. No. 1 on the list: "When will Oracle release the object/relational [database] it has been promising since 1993?"

### Applets should learn manners

Sun Microsystems vigorously defended Java security at IntraNetworking Summit '96 last week in Washington. Despite widely reported accounts of security holes in Java, it is safe to download Java applets, said Steven Fritzinger, a Java technologist at Sun. But Fritzinger said it isn't possible to be completely safe from hostile applets, which he prefers to call "rude applets." Fritzinger's solution to the problem of rude applets on the Internet: "Just don't go back to that Web page again."

### A Compaq fit

Compaq is close to launching a systems integration unit, sources close to the company said. The move would make economic sense for Compaq — profit margins for PCs are typically 15% to 20% vs. 30% to 45% margins for service agreements. It's unclear whether Compaq will build its own services unit or acquire one.

### Netscape seeks a few good IS workers

Lots of jobs are available at Netscape, which went from 325 employees in September 1995 to 1,400 last month. But no department has more open slots than information systems; there were 44 available positions at last count. Fancy yourself a candidate? You gotta know perl, Unix and Netscape's own products inside and out. Netscape says it subscribes to the "glass house" theory of IS, which means it is a showcase for its own World Wide Web servers, browsers and electronic commerce applications. Having Oracle experience won't hurt, either. Netscape officials say they used the database long before they signed last month's mutual back-scratching deal with Oracle.

### What's in a name?

Ever heard of Synet? Microsoft has. The small Internet service provider in Downers Grove, Ill., recently filed suit against Microsoft for allegedly violating a trademark on the term "Internet Explorer." That is what Microsoft calls its Web browser, but it's also what Synet named its Internet access kit. Synet registered the name for a state trademark last year and applied for a U.S. trademark soon after. Despite the lawsuit, which seeks to stop Microsoft from using the term and unspecified damages, Microsoft hasn't budged.

*From the cyberjoke factory comes these definitions: PCMCIA (People Can't Memorize Computer Industry Acronyms); ISDN (It Still Does Nothing); Apple (Arrogance Produces Profit-Losing Entity); SCSI (System Can't See It); DOS (Defunct Operating System); Basic (Bill's Attempt to Seize Industry Control); IBM (I Blame Microsoft); DEC (Do Expect Cuts); CD-ROM (Consumer Device, Rendered Obsolete in Months); OS/2 (Obsolete Soon, Too); WWW (World Wide Wait); Macintosh (Most Applications Crash, If Not, The Operating System Hangs). If you have acronyms, jokes or news tips to share, call news editor Patricia Keefe at (508) 820-8183.*

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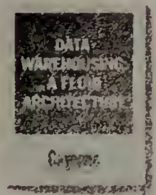

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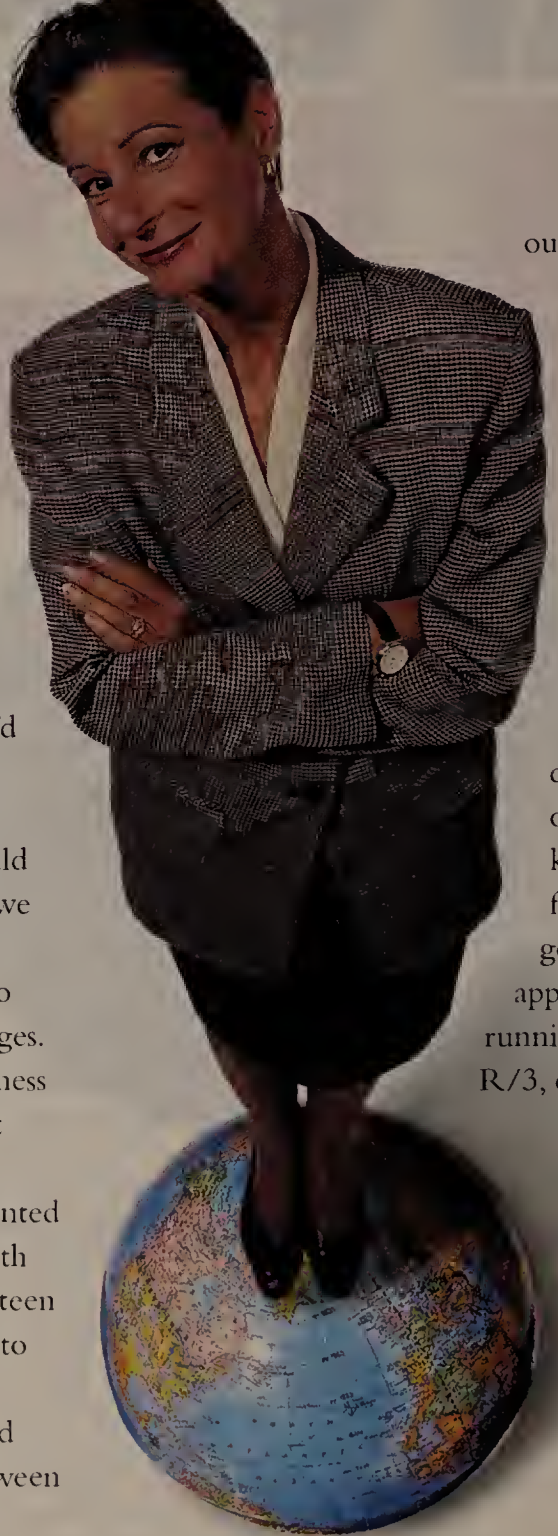
# "Are we happy with our global SAP implementation? You bet your 2バイトの漢字 we are."

*—Kathleen Cote, CEO, Computervision Corporation.*



"After all, SAP software has helped us become the ninth-largest software company in the world.

"Especially impressive since we were a hardware company when we started looking for a new system.

"In 1992, we had come to the realization that our business processes needed major streamlining. That our technology infrastructure was far too complex and inefficient. And that we'd never be able to grow or change our business model fast enough as a result.

"We looked for a solution that would give us the flexibility and efficiencies we so obviously needed. Since we were already a global company, it also had to handle multiple currencies and languages.

"And SAP was and is the only business software company with a solution that does it all.

"In fact, not only have we implemented their R/3 system in 18 subsidiaries with 25 different currencies and data in thirteen languages. SAP even worked with us to develop a unique single database that contains our Japanese data in Kanji and Katakana, for seamless integration between our Japanese subsidiary and the entire enterprise.

"And when we changed our business model from a hardware company to a software and services company in 1993, we reconfigured our SAP system over the course of a weekend. You can't get more flexible than that.

"Over a three-year period of worldwide implementation, we average more than a module per country each month. Leveraging our own people with consultants, we've kept consulting costs down to 73 cents for every software dollar. And we've gone from running 123 home-grown applications on 400 minicomputers to running a handful of applications, including R/3, on only 40 servers and minicomputers.

"More importantly, the entire implementation has paid for itself. We've more than recovered our investment through savings in Distribution, Finance and Administration, and IT. All of which were critical to our changing businesses.

"All I can say is, 素晴らしい"

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